SEW EURODRIVE

Manual

Controllers
DHE21B / DHF21B / DHR21B (standard)
DHE41B / DHF41B / DHR41B (advanced)

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1 General Information

1.1 How to use the documentation

The manual is part of the product and contains important information on operation and service. The manual is written for all employees who assemble, install, startup, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent danger	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment
INFORMATION	Useful information or tip: Simplifies the handling of the drive system.	

1.2.2 Structure of section safety notes

Section safety notes do not apply to a specific action, but to several actions pertaining to one subject. The used symbols indicate either a general or a specific hazard.

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- ⚠**SIGNAL WORD** Nature and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the danger.

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1.3 Right to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Therefore, read the manual before you start operating the device.

Make sure that the manual is available to persons responsible for the plant and its operation as well as to persons who work independently on the device. You must also ensure that the documentation is legible.

1.4 Exclusion of liability

You must observe this documentation and the documentation of the connected devices from SEW-EURODRIVE to ensure safe operation and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.5 Copyright

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2 Safety Notes

2.1 Other applicable documentation

- Read through this document carefully before you commence installation and startup of the DH.21B/41B options.

The following publications and documents apply to the connected units:

- Operating instructions for the units (such as for MOVIDRIVE® B, MOVITRAC® B, MOVIAXIS®)
- Only electrical specialists are allowed to perform installation and startup observing the relevant accident prevention regulations and the operating instructions of the connected units (such units are, for example, MOVIDRIVE® MDX60B/61B, MOVITRAC® B, MOVIAXIS®).
- For units with functional safety, also observe the corresponding manual "Functional Safety" or "Safe Disconnection – Conditions".
- You must adhere to the information in the documentation as a prerequisite to fault-free operation and fulfillment of warranty claims.

2.2 Bus systems

The DH.21B and DH.41B options support various bus systems. A bus system makes it possible to adapt frequency inverters to the particulars of the machinery within wide limits. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the unit behavior. This may result in unexpected, though not uncontrolled, system behavior.

2.3 Safety functions

MOVIDRIVE® MDX60B/61B and MOVITRAC® B inverters may not perform any safety functions without higher-level safety systems. Use higher-level safety systems to ensure protection of equipment and personnel. For safety applications, ensure that the information in the following publications is observed: "Safe Disconnection for MOVIDRIVE® MDX60B/61B / MOVITRAC® B".

2.4 Hoist applications

MOVIDRIVE® MDX60B/61B, MOVITRAC® B and MOVIAXIS® must not be used as a safety device in hoist applications.

Use monitoring systems or mechanical protection devices as safety equipment to avoid possible damage to property or injury to people.

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2.5 Disposal

Observe the applicable national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, as:

- Electronics scrap
- Plastic
- Sheet metal
- Copper

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3 Introduction

3.1 General information

3.1.1 Content of this manual

This user manual describes the following:

- How to install the DH.21B/41B options in MOVIDRIVE® MDX61B
- Interfaces and LEDs of the DH.21B/41B options
- How to install the DH.21B/41B options in MOVIDRIVE® MDX61B and MOVITRAC® B inverters, in MOVIAXIS® servo inverters, and in stand-alone housings
- Engineering access to the DH.21B/41B options
- Project planning and startup of DH.21B/41B options

3.1.2 Additional documentation

To be able to configure and start up the DH.21B/41B options simply and effectively, you should also order the following publications in addition to this manual:

- "DHF21B/41B Controller PROFIBUS DP-V1 and DeviceNet Fieldbus Interfaces" manual
- "DHR21B/41B Controller PROFINET IO, EtherNet/IP, Modbus TCP/IP Fieldbus Interfaces" manual
- MOVIDRIVE® MDX60/61B system manual
- MOVITRAC® B system manual
- MOVIAXIS® system folder

When used as freely programmable motion and logic controller with SD card OMH41B:

- "MOVI-PLC® Programming in the PLC Editor" system manual

  The "MOVI-PLC® Programming in the PLC Editor" system manual contains instructions for IEC 61131-3 compliant programming.
- "MPLCMotion_MDX and MPLCMotion_MX Libraries for MOVI-PLC®" manual
- "MPLCMotion_MC07 and MPLCMotion_MM Libraries for MOVI-PLC®" manual

  The library relevant manuals describe the motion libraries for controlling MOVIDRIVE® MDX60B/61B, MOVIAXIS®, MOVITRAC® B, and MOVIMOT® inverters.

When used as configurable application controller with SD card OMC41B:

- Manuals for the respective application modules

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3.2 Overview of controllers

3.2.1 Freely programmable motion and logic controller (MOVI-PLC®)

The controller can be operated as freely programmable motion and logic controller MOVI-PLC® when using SD cards of the type OMH41B. MOVI-PLC® is a series of programmable motion and logic controllers. It allows drive solutions, logic processes and sequence controls to be automated simply and efficiently using IEC 61131-3 compliant programming languages.

- MOVI-PLC® is a **universal** solution because it is able to control the entire portfolio of SEW inverters and offers a simple upgrade to a more powerful MOVI-PLC® version due to the fact that all possible programs can be executed.
- MOVI-PLC® is **scalable** due to several different hardware platforms (standard, advanced, etc.) and modular software concepts (libraries for numerous applications).
- MOVI-PLC® is **powerful** due to extensive technologies (such as electronic cam, synchronous operation) and the control of demanding applications (such as material handling).

Performance class MOVI-PLC® standard

- DH.21B controllers enable coordinated single axis movements and integration of external inputs/outputs as well as Drive Operator Panels (DOP). The DH.21B.. option is therefore suitable for use as a module controller or stand-alone controller for machines of medium complexity.

Performance class MOVI-PLC® advanced

- The DH.41B controller is characterized by a great variety of interfaces and a higher performance level, which allows complex calculations and interpolated movements, for example. The DH.41B option is therefore suitable for the automation of cells and machines. The integrated Ethernet interface enables direct connection of the DH.41B controller to the control level.

3.2.2 Configurable application controller (CCU)

The controller can be used as configurable application controller (CCU) by using SD cards of the type OMC41B. Only standardized application modules created by SEW-EURODRIVE can be executed. The application modules can be started up quickly and conveniently by graphical configuration. A defined process data interface provides this functionality to a higher-level controller. A process data monitor with control mode is available to support the startup procedure.

CCU standard performance class

The "CCU standard" performance class is intended for application modules with single-axis functionality and medium response times. A maximum of 16 axes can be connected to a configurable application controller. The following application modules are available and can be started up using the *AxisConfigurator* tool.

- Speed specification
- Cam positioning
- Bus positioning with 6 process data
- Single-axis universal module

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Performance class CCU advanced

The "CCU advanced" performance class is intended for application modules with single-axis and multi-axis functionality and fast response times. The following application modules are available:

- Single-axis functionality:
  - Speed specification
  - Cam positioning
  - Bus positioning 6 process data
  - Single-axis universal module
- Multi-axis functionality:
  - SyncCrane
  - Energy-efficient SRU

3.3 Controller DH.21B/41B

3.3.1 Features

Two types of DH.21B/41B controllers are available:

- As **option card** DH.21B/41B for MOVIDRIVE® B and MOVITRAC® B inverters (only DHE21B/41B) and for MOVIAXIS® servo inverters
- In **stand-alone housing** DH.21B/41B UOH.1B prepared for installation on a mounting rail.

3.3.2 Device types

Three types of DH.21B/41B controllers are available, which differ in the fieldbus interfaces:

DH.21B/41B type	Fieldbus interfaces
DHE21B/41B	Ethernet TCP/IP, UDP
DHF21B/41B	Ethernet TCP/IP, UDP, PROFIBUS DP-V1, DeviceNet
DHR21B/41B	Ethernet TCP/IP, UDP, PROFINET, EtherNet/IP, ModbusTCP/IP

3.3.3 Overview of communication interfaces

The DH.21B/41B option is equipped with numerous communication interfaces.

The two system bus interfaces CAN 1 and CAN 2 are primarily used for connecting and controlling several inverters and for integrating decentralized I/O modules.

You can operate this machine module on a higher-level controller using the integrated fieldbus interface.

An operator terminal (e.g. DOP11B) or a MOVIMOT® gearmotor with integrated frequency inverter is connected to the RS485 interfaces.

SEW drives and SEW I/O modules with EtherCAT interface can be connected to the SBUS^{PLUS}® system bus interface.

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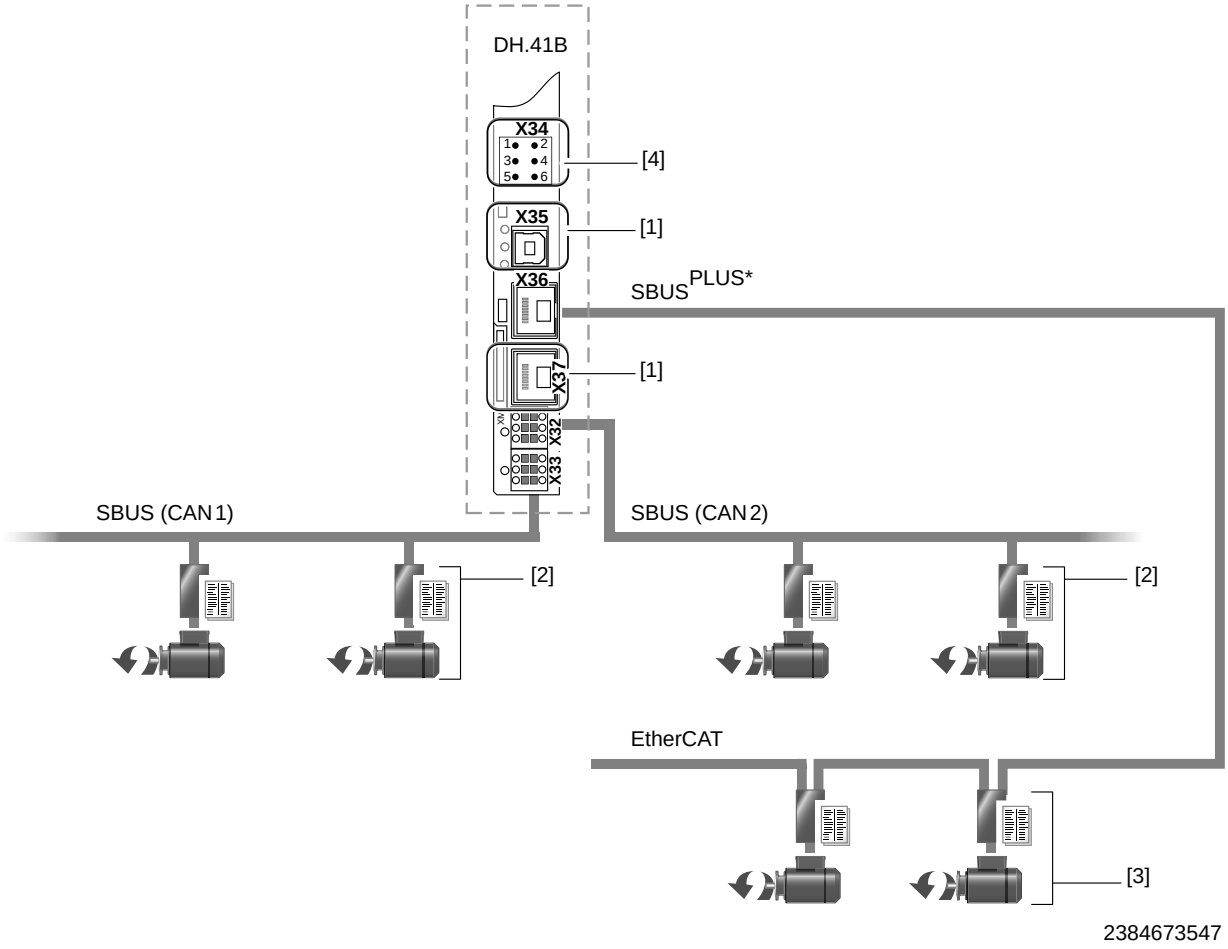

[1] Engineering interface USB (X35) and Ethernet 2 (X37)
[2] SEW inverter with SBus interface (X32/X33)
[3] SEW inverter with EtherCAT interface (X36)
[4] 2 × RS485 interfaces (X34)

3.3.4 Engineering

Engineering of the DH.21B/41B option includes the following activities:

- Configuration
- Parameterization
- Programming (only MOVI-PLC®)

These activities are carried out using the MOVITOOLS® MotionStudio engineering software. The software has a number of useful features for startup and diagnostics of all SEW-EURODRIVE units. The DH.21B/41B option is connected with the engineering PC via

- Ethernet communication interface (X37)
- USB interface (X35)
- Engineering channels of the fieldbus system used

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3.3.5 System buses CAN 1, CAN 2 and Ethernet 1

You can use the DH.21B/41B option to control a machine module by connecting several inverters via the system bus. The DH.21B/41B option controls all drives within the machine module and in this way takes load off the higher-level controller (e.g. machine/ system PLC). You can connect a total of **maximum 16 units to the DH.21B option**, and a total of **maximum 64 units to the DH.41B option** via system buses CAN 1, CAN 2, and Ethernet 1:

- MOVITRAC® B frequency inverter
- MOVIDRIVE® MDX60B/61B drive inverter
- MOVIAXIS® servo inverter
- Gearmotor with integrated frequency inverter MOVIMOT® (Fieldbus interface DeviceNet MFD... required)
- I/O coupler (OCC11B/OCE11B)

3.3.6 RS485 interfaces COM1 and COM2

Connect one of the following devices each to the RS485 interfaces COM1 or COM2:

- DOP11B operator terminal
- MOVIMOT® gearmotor with integrated frequency inverter

3.3.7 Ethernet 2

You can implement the following functions and connections using the Ethernet 2 communication interface:

- Connection of a DOP11B operator terminal
- PC visualization (e.g. OPC interface)
- Connection to master level

3.3.8 Binary inputs and outputs

Binary inputs and outputs enable you to switch actuators (e.g. valves) and evaluate binary input signals (e.g. sensors).

3.3.9 Diagnostic LEDs

The LEDs of the DH.21B/41B options indicate the following states:

- Voltage supply of the binary inputs and outputs
- General state of the DH.21B/41B options
- State of the control program
- State of the fieldbus interface (DHF/DHR)
- State of the Ethernet interface
- State of both CAN interfaces

You can connect operator terminals to perform diagnostics. It is recommended to connect an operator terminal to the communication interface Ethernet 2.

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4 Assembly and Installation Notes

4.1 Installation options of DH.21B/41B

Observe the following installation instructions:

INFORMATION

- You can insert the DH.21B/41B option in the MOVIDRIVE® MDX61B inverter. Do not insert it in the MOVIDRIVE® MDX60B inverter.
- Option cards can only be installed or removed for MOVIDRIVE® MDX61B sizes 1 to 6.
- The installation or removal of option cards for MOVIDRIVE® MDX61B size 0 inverters must only be carried out by SEW-EURODRIVE engineers.
- The installation or removal of the DH.21B/41B option in MOVIAXIS® as well as the installation of the stand-alone housing DH.21B41B/UOH..B must only be carried out by SEW-EURODRIVE engineers.

4.2 Installing the DH.21B/41B option in MOVIDRIVE® MDX61B

- You must insert the DHE21B/DHE41B option into the fieldbus slot of MOVIDRIVE® MDX61B. If the fieldbus slot is not available, you can plug the DHE21B/41B option into the expansion slot.
- You must insert the DHF21B/DHR21B and DHF41B/DHR41B options into the expansion slot of MOVIDRIVE® MDX61B. It cannot be installed in MOVIDRIVE® MDX61B size 0.

4.2.1 Before you start

Read the following notes before installing or removing DH.21B/41B options:

- Disconnect the inverter from power. Switch off the DC 24 V and the line voltage.
- Before touching the DH.21B/41B option, take appropriate measures (discharge strap, conductive shoes, etc.) to protect it from electrostatic charge.
- **Before installing** the DH.21B/41B option, remove the keypad and the front cover.
- **After installing** the DH.21B/41B option, replace the front cover and the keypad.
- Keep the DH.21B/41B option in its original packaging until immediately before you are ready to install it.
- Hold the DH.21B/41B option only by its edges. Do not touch any of the components.
- Never place the DH.21B/41B option on a conductive surface.

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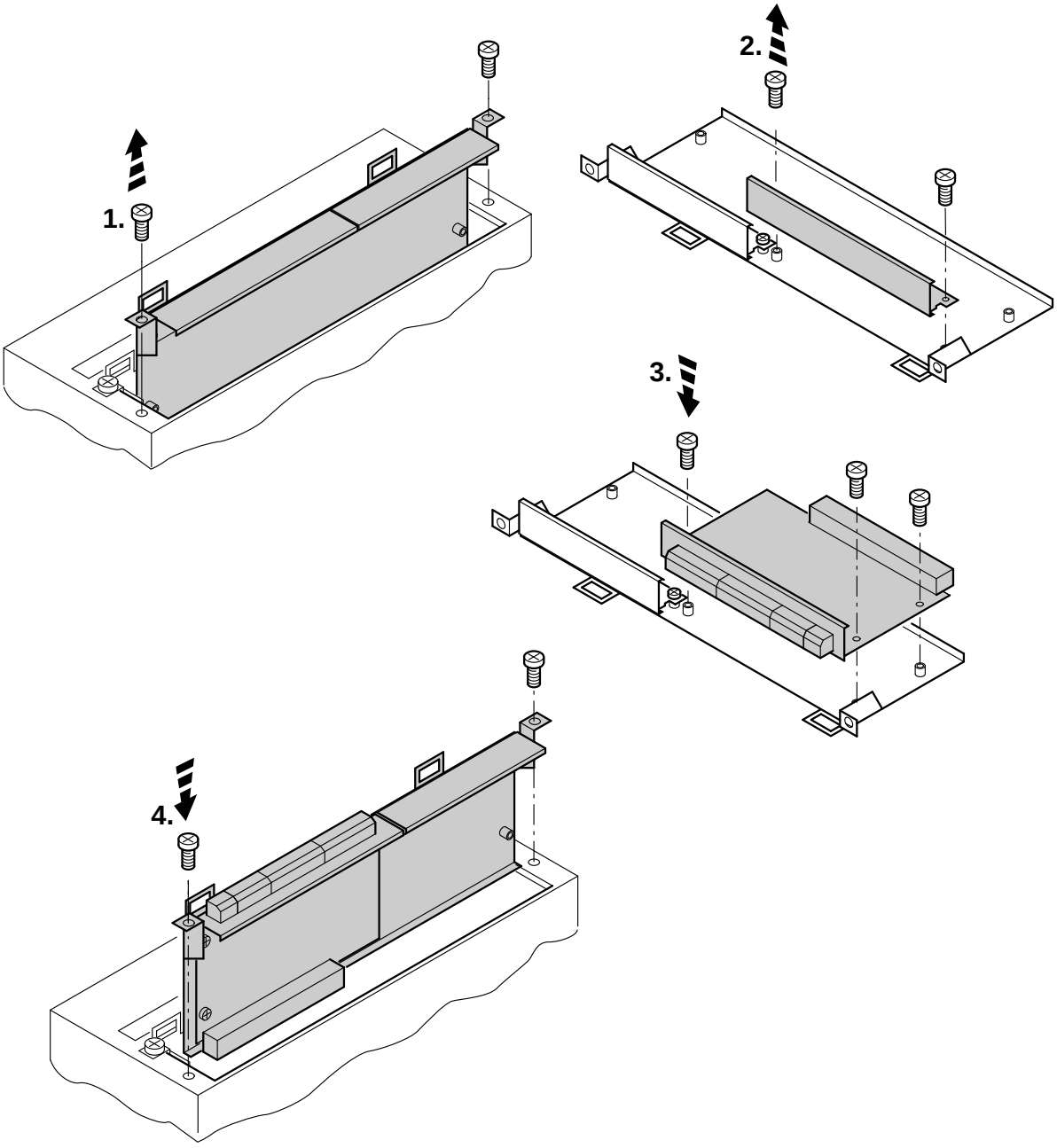
4.2.2 Basic procedure for installing or removing an option card in MOVIDRIVE® MDX61B



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1. Remove the retaining screws holding the card retaining bracket. Pull the card retaining bracket out evenly from the slot (do not twist!).
2. Remove the retaining screws of the black cover plate on the card retaining bracket. Remove the black cover plate.
3. Position the option card onto the retaining bracket so that the retaining screws fit into the corresponding bores on the card retaining bracket.
4. Insert the retaining bracket with the installed option card into the slot, pressing slightly so it is seated properly. Secure the option card retaining bracket with the retaining screws.
5. Follow the instructions in reverse order when removing the option card.

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4.3 Installing the DH.21B/41B option in MOVIDRIVE® MDX61B

INFORMATION

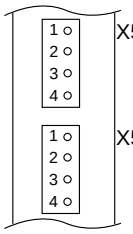
The DH.21B/41B option is installed as described in the "Installation options of DH.21B/41B" chapter. The DH.21B/41B option is powered via MOVIDRIVE® MDX61B. A separate voltage supply is only required for the binary inputs and outputs (connector X31). For wiring the system bus, connect the X33 plug (CAN 1) or X32 (CAN 2) of the DH.21B/41B option with X12 of MOVIDRIVE® MDX61B.

4.4 Installing the DH.21B/41B option in the MOVIAXIS® master module

INFORMATION

The DH.21B/41B option is installed as described in the "Installation options of DH.21B/41B" chapter. For wiring the system bus, connect connector X33 (CAN 1) or X32 (CAN 2) of the DH.21B/41B option with X9 (signal bus of the MOVIAXIS® supply module or of a MOVIAXIS® axis module), or with X12 (CAN 2 bus of a MOVIAXIS® axis module). The MOVIAXIS® master module provides additional connections that are described in the following section.

4.4.1 Functional description of terminals X5a / X5b (MOVIAXIS® master module)

MOVIAXIS® master module MXM	Designation	Terminal		Function
 2107418379	**X5b connector**	**X5b:1** **X5b:2** **X5b:3** **X5b:4**	DC 24 V_E DGND DC 24 V_B BGND	Voltage supply for control electronics Reference potential for control electronics Voltage supply for brake Reference potential for brake connection
	Terminal X5a	**X5a:1** **X5a:2** **X5a:3** **X5a:4**	DC 24 V_E DGND DC 24 V_B BGND	Voltage supply for control electronics Reference potential for control electronics Voltage supply for brake Reference potential for brake connection

- The terminals X5a and X5b are connected in parallel. In this way, the voltage supply of the MOVIAXIS® master module can be provided from the right to X5b or from below to X5a. With connection to X5a, further modules can be connected via X5b (e.g. supply module, axis module). The voltage supply for the brake (X5a/b:3,4) is fed through the MOVIAXIS® master module.
- The DH.21B/41B option can be supplied from the MOVIAXIS® switched-mode power supply (MXS) or from an external voltage source. To do so, connect X5 between the individual units.
- If the DH.21B/41B option is connected with DC 24 V from the MOVIAXIS® switched-mode power supply, the functioning of the DH.21B/41B option is maintained after disconnection from the power supply. This is the case if the DC link voltage is maintained or an external DC 24 V supply is present from the MOVIAXIS® switched-mode power supply.

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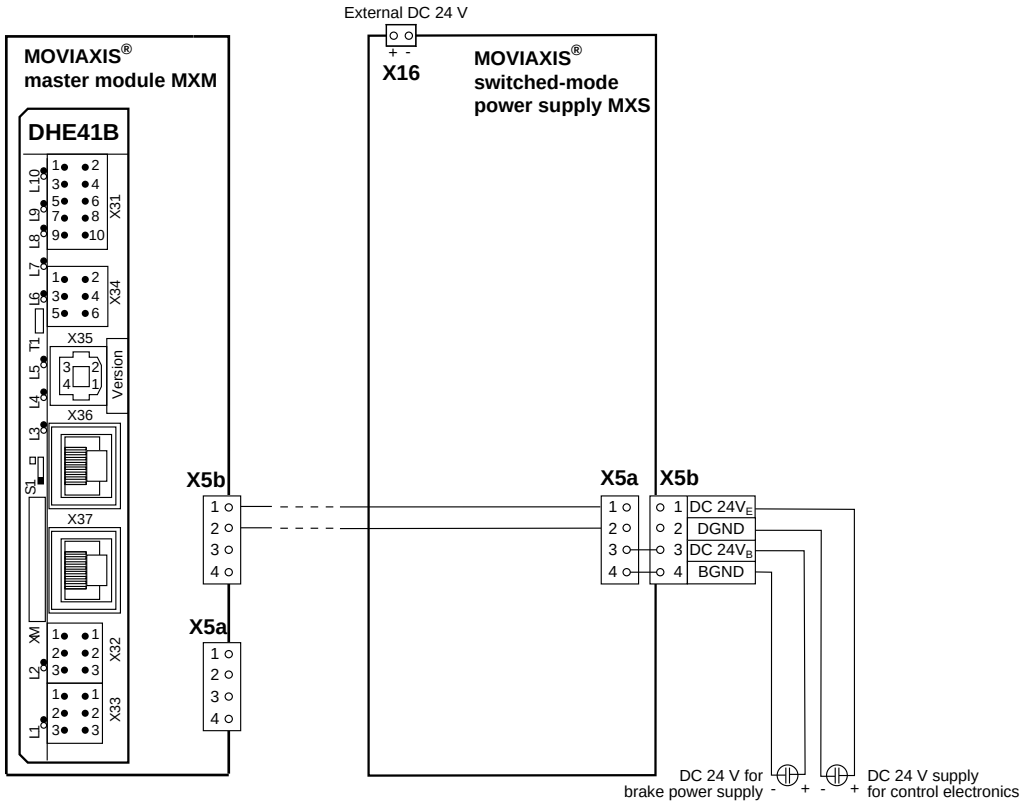
Wiring diagram



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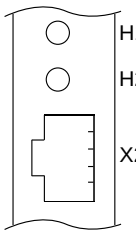
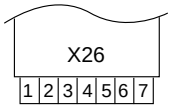
4.5 Installing the DH.21B/41B option in MOVITRAC® B / stand-alone unit

INFORMATION

The DH.21B/41B option is installed as described in the "Installation options of DH.21B/41B" chapter. The option card slot MOVITRAC® B and the stand-alone unit provide additional connections for the DH.21B/41B option. These connections are described below.

4.5.1 Description of terminals and LEDs

Front view MOVITRAC® B/ stand-alone unit	Designation	LED Terminal		Function
 2108468363	**LED**	**H1**		Reserved
		H2		Reserved
	X24 connector: **RS485 COM 1** **(RJ10 socket)**	**X24:4**	DGND	Reference potential COM 1
		X24:3	RS–	Signal RS485–
		X24:2	RS+	Signal RS485+
		X24:1	5 V	Voltage output DC +5 V

Side view Stand-alone unit	Designation	Terminal		Function
 2108496651	**X26 connector:** **CAN 1 and voltage supply** **(plug-in terminal)**	**X26:1**	CAN 1H	System bus CAN 1 high
		X26:2	CAN 1L	System bus CAN 1 low
		X26:3	DGND	Reference potential control/CAN1
		X26:4	Reserved	-
		X26:5	Reserved	-
		X26:6	DGND	Reference potential control/CAN1
		X26:7	DC 24 V	Voltage supply for controller

4.5.2 RS485 interface COM1 connection (connector X24)

The connectors X24 and X34:1/3/5 are connected in parallel. You can connect a DOP11B operator terminal at X24. If X24 is unassigned, you can connect an operator terminal or a gearmotor with integrated MOVIMOT® frequency inveter to X34:1/3/5.

For more information, refer to "RS485 interface connection (X34)".

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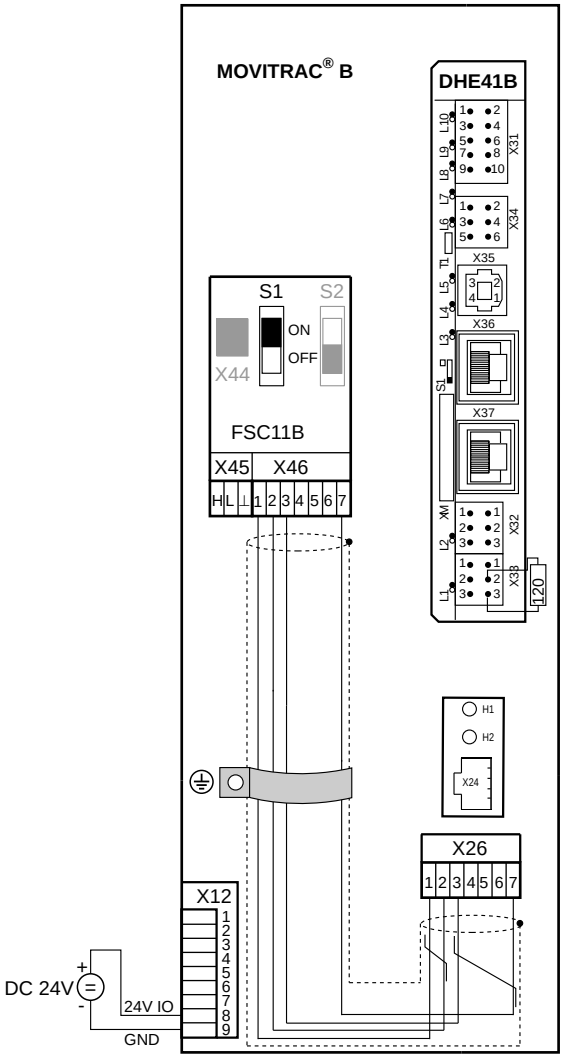
4.5.3 Connecting CAN 1 system bus/voltage supply (X26)

X26:1/2/3 and connector X33 are connected in parallel. The DH.21B/41B option in the compact controller is supplied with voltage via X26:6/7.

The DHE21B/41B option can be supplied with the required voltage by MOVITRAC® B. To do so, connect X26:3 (6)/7 with X46:3 (6)/7 or with X12:9/8. If MOVITRAC® B supplies the DHE21B/41B option with DC 24 V, then the functions of the DHE21B/41B option are also ensured after disconnection from the supply system. This requires an external DC 24 V supply to X12:8/9 of MOVITRAC® B.



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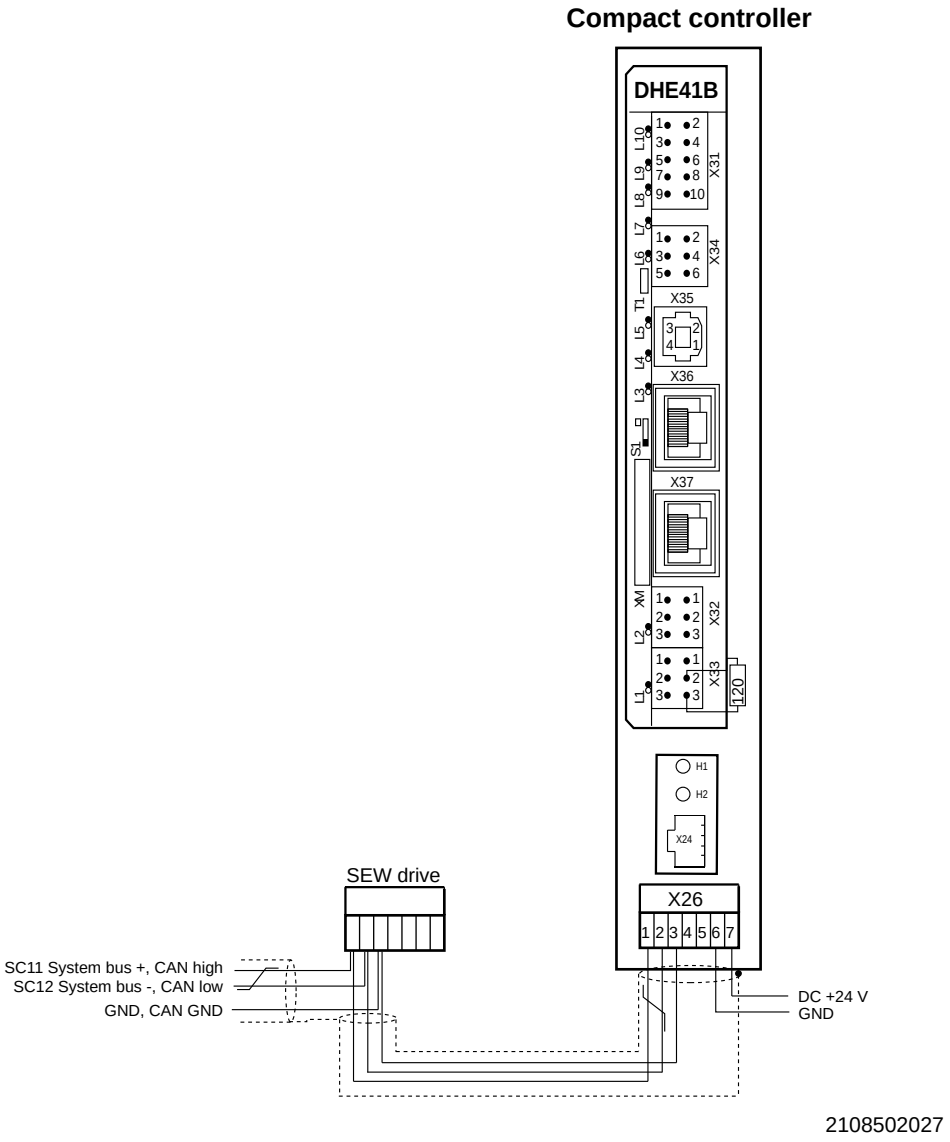

4.5.4 LED when installed in MOVITRAC®/stand-alone unit

LED H1, H2 LEDs H1 and H2 are reserved.

4.6 Shielding and routing bus cables

Only use shielded cables and connection elements that also meet the requirements of category 5, class 2 in compliance with IEC 11801 edition 2.0.

Correct shielding of the bus cable attenuates electrical interference that can occur in industrial environments. The following measures ensure the best possible shielding:

- Manually tighten the mounting screws on the connectors, modules, and equipotential bonding conductors.
- Use only connectors with a metal housing or metallized housing.
- Connect the shielding in the connector over a wide surface area.
- Apply the shielding of the bus cable on both ends.
- Route signal and bus cables in separate cable ducts. Do not route them parallel to power cables (motor leads).
- Use metallic, grounded cable racks in industrial environments.
- Route the signal cable and the corresponding equipotential bonding close to each other using the shortest possible route.
- Avoid using plug connectors to extend bus cables.
- Route the bus cables closely along existing grounding surfaces.

NOTICE

In case of fluctuations in the ground potential, a compensating current may flow via the bilaterally connected shield that is also connected to the protective earth (PE). In such a case, make sure you supply adequate equipotential bonding in accordance with relevant VDE regulations.

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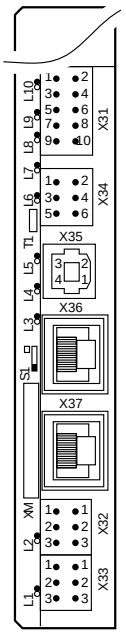
4.7 Installing the DH.21B/41B option

4.7.1 Functional description of terminals, DIP switches and LEDs

Front view DH.21B/41B option	Designation	LED DIP switch Terminal		Function
 2102456075	**LED**	**LED 10** **LED 9** **LED 8** **LED 7** **LED 6** **LED 5** **LED 4** **LED 3** **LED 2** **LED 1**	24 V / I/O OK DIO0/1 DIO2/3 DIO4/5 DIO6/7 User LED PLC state IEC progr. state CAN 2 state CAN 1 state	State of voltage supply I/O State of input or output DIO 0/1 State of input or output DIO 2/3 State of input or output DIO 4/5 State of input or output DIO 6/7 Freely programmable State of control firmware State of control program State of CAN 2 system bus State of CAN 1 system bus
	Terminal X31: **Binary inputs and outputs** **(plug-in terminals)**	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9** **X31:10**	+24 V input BZG 24 V DIO 0 DIO 1 DIO 2 DIO 3 DIO 4 DIO 5 DIO 6 DIO 7	Voltage input DC +24 V Reference potential for binary signals Binary input or output (DIO 0) Binary input or output (DIO 1) Binary input or output (DIO 2) Binary input or output (DIO 3) Binary input or output (DIO 4) Binary input or output (DIO 5) Binary input or output (DIO 6) Binary input or output (DIO 7)
	Terminal X34: **RS485 interfaces COM1, COM2** **(plug-in terminals)**	**X34:1** **X34:2** **X34:3** **X34:4** **X34:5** **X34:6**	RS+ RS+ insulated RS– RS– insulated DGND GND insulated	Signal RS485+ (COM 1) Signal RS485+ insulated (COM 2) Signal RS485– (COM 1) Signal RS485– insulated (COM 2) Reference potential (COM 1) Reference potential (COM 2)
	X35 terminal: **USB connection**	**X35:1** **X35:2** **X35:3** **X35:4**	USB +5 V USB– USB+ DGND	Standard USB-B assignment
	X36 terminal: **Ethernet 1 connection** **System bus (RJ45 socket)**	**X36**		Standard Ethernet assignment
	X37 terminal: **Ethernet 2 connection** **(RJ45 socket)**	**X37**		
	X32 terminal: **CAN 2 system bus** **(electrically isolated)** **(plug-in terminals)**	**X32:1** **X32:2** **X32:3**	BZG_CAN 2 CAN 2H CAN 2L	Reference potential for system bus CAN 2 System bus CAN 2 high System bus CAN 2 low
	X33 terminals: **CAN 1 system bus** **(plug-in terminals)**	**X33:1** **X33:2** **X33:3**	DGND CAN 1H CAN 1L	Reference potential for system bus CAN 1 System bus CAN 1 high System bus CAN 1 low
	DIP switch	**S1**	Up Down	Default IP address (192.168.10.4) IP parameter from SD memory card

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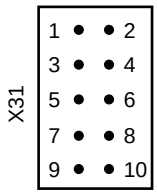
4.7.2 Connecting binary inputs and outputs (X31 terminal)

Terminal X31 provides eight binary inputs or outputs (e.g. for controlling external actuators/sensors).



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Binary inputs

- The binary inputs are electrically isolated by optocouplers.
- The permitted input voltages are defined according to IEC 61131.

  +13 V – +30 V = "1" = contact closed

  –3 V – +5 V = "0" = contact open

Binary outputs

- The binary outputs are electrically isolated by optocouplers.
- The binary outputs are short-circuit proof but not interference-voltage-proof.
- The maximum permitted output current is 150 mA per binary output. All eight binary outputs can be operated simultaneously with this current.

NOTICE

The supply voltage must be present on X31:1/2 when using binary inputs and outputs.

The DH.21B/41B option might be damaged. In this case, the specified function of the binary inputs and outputs is no longer ensured.

If the supply voltage is switched off, you must switch off all other voltages at X31:1 to 10, e.g. DC 24 V of switches and sensors at the binary inputs.

- To prevent dangerous voltage peaks from occurring, do not connect inductive loads to the supply voltage or the binary inputs or outputs without free running diodes.

Cable specification

- Only connect cables with a minimum core cross section of 0.25 mm^2 (AWG23) and a maximum core cross section of 1 mm^2 (AWG18). Clamping without conductor end sleeves is possible in accordance with IEC 60999.
- Choose the type and core cross section of the connected cable in dependency of the required cable length and the load expected from your application.

For more information on binary inputs or outputs, refer to the "Technical Data" chapter.

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4.7.3 Connnection to system bus CAN 2 (X32) / CAN 1 (X33)

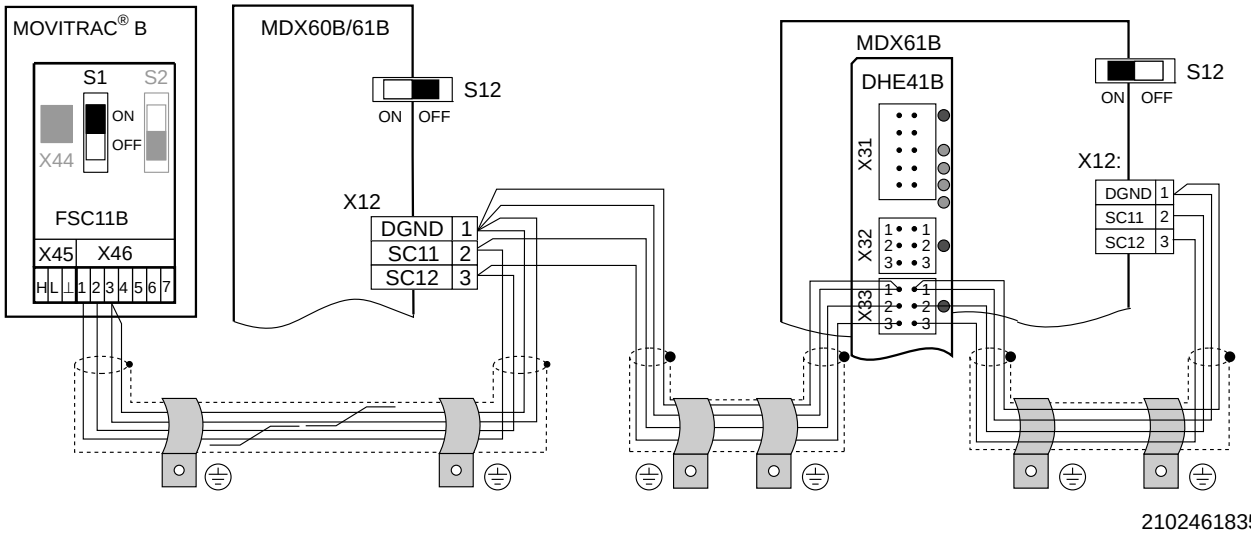
You can connect a maximum of 16 units to the DH21B option and a maximum of 64 units to the DH.41B option on the CAN 2 or CAN 1 system bus. The system bus supports the address range 0 to 63.

INFORMATION

- The CAN 2 system bus is electrically isolated. We therefore recommend to use the CAN 2 (X32) interface for connecting field devices (e.g. CANopen inputs and outputs).
- The CAN 1 system bus is **not** electrically isolated. We therefore recommend to use the CAN 1(X33) interface to connect inverters via the system bus in the control cabinet.
- A system CAN connection is required for communication between MOVIDRIVE® MDX61B and the integrated controller.

The CAN system bus supports transmission systems compliant with ISO 11898. The "Serial Communication" manual contains detailed information on the system bus. This manual can be ordered from SEW-EURODRIVE.

Wiring diagram for CAN 1 system bus



Cable specification

- Use a 2 × 2-core twisted and shielded copper cable (data transmission cable with braided copper shield). Clamping without conductor end sleeves is possible in accordance with IEC 60999. The cable must meet the following specifications:
  - Cable cross section 0.2 mm^2 – 1.0 mm^2 (AWG24 – AWG18)
  - Cable resistance 120 Ω at 1 MHz
  - Capacitance per unit length ≤ 40 pF/m at 1 kHz

  Suitable cables include CAN bus or DeviceNet cables.

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Cable length

- The permitted total cable length depends on the baud rate setting of the system bus:
  - 125 kBaud → 500 m
  - 250 kBaud → 250 m
  - **500 kBaud → 100 m**
  - 1000 kBaud → 40 m

Terminating resistor

- Switch-on the system bus terminating resistor at the start and end of the CAN system bus connection (MOVIDRIVE® B, DIP switch S12 = ON; MOVITRAC® B, DIP switch S1 = ON). For all other devices, switch off the terminating resistor (MOVIDRIVE® B, DIP switch S12 = OFF; MOVITRAC® B, DIP switch S1 = OFF). For example, if the DH.21B/DH.41B option is located at the end of the CAN 2 system bus, you have to connect a terminating resistor of 120 Ω between pins X32:2 and X32:3 (for CAN 1: terminating resistor between pins X33:2 and X33:3).

NOTICE

- There **must not** be any potential displacement between the units connected via CAN 2 system bus.
- There **must not** be any potential displacement between the units connected via CAN 1 system bus.
- Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.

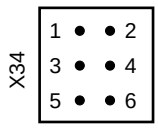
4.7.4 RS485 interface connection (X34)

NOTICE

- There must not be any potential displacement between the units connected via RS485. Take suitable measures to avoid potential displacement, such as connecting the unit ground connectors using a separate cable.
- Dynamic terminating resistors are installed. **Do not connect any external terminating resistors.**

You can connect one of the following units to each of the RS485 interfaces COM1/2 (terminal X34).

- DOP11B operator terminal
- MOVIMOT® gearmotor with integrated frequency inverter



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INFORMATION

For more information on how to connect the DOP11B operator terminal, refer to the sections "Installation" and "Pin assignment" in the DOP11B operator terminal manual.

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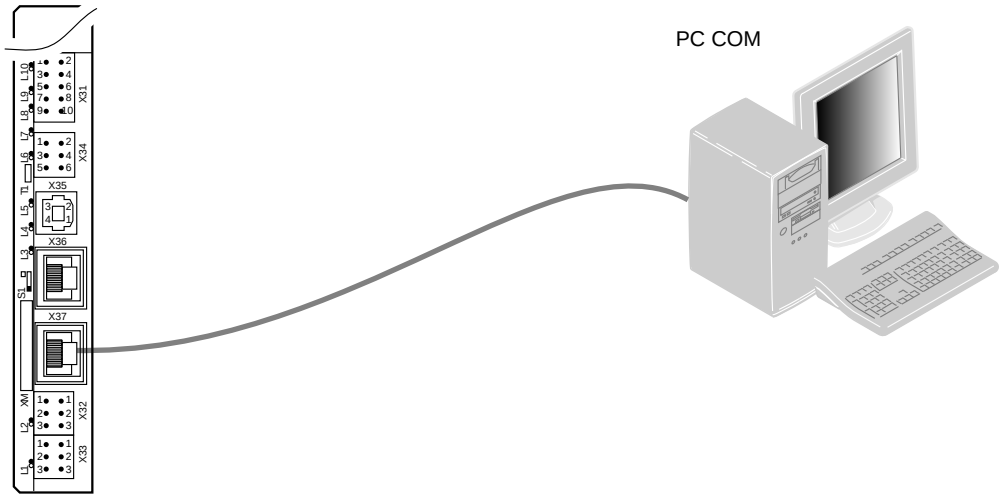
4.7.5 System bus Ethernet 1 connection (X36)

The Ethernet 1 interface (X36) serves as system bus master of the fast SBUS$^{Plus®}$ system bus.

4.7.6 Ethernet 2 interface connection (X37)

You can connect an engineering PC to the Ethernet 2 interface (X37).



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Using the Ethernet 2 interface, the DH.21B/41B option can also exchange data with another controller via UDP/TCP.

4.7.7 LEDs of the DH.21B/41B option

The DH.21B/41B option comes equipped with 10 LEDs (L1 through L10) that indicate the present state of the option and its interfaces.

LED L1 (CAN 1 state)

LED **L1** indicates the **state** of the **CAN 1** system bus.

State of the L1 LED	Diagnostics	Remedy
Orange	The CAN 1 system bus is being initialized.	-
Green	The CAN 1 system bus is being initialized.	
Flashing green (0.5 Hz)	The CAN 1 system bus is currently in SCOM suspend mode.	
Flashing green (1 Hz)	The CAN 1 system bus is currently in SCOM On mode.	
Red	The CAN 1 system bus is off (BUS-OFF).	1. Check and correct the cabling of the CAN 1 system bus. 2. Check and correct the baud rate set for the CAN 1 system bus. 3. Check and correct the terminating resistors of the CAN 1 system bus.
Flashing red (1 Hz)	Warning on the CAN 1 system bus.	1. Check and correct the cabling of the CAN 1 system bus. 2. Check and correct the baud rate set for the CAN 1 system bus.

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LED L2 (CAN 2 state)

LED **L2** indicates the **state** of the **CAN 2** system bus.

State of the L2 LED	Diagnostics	Remedy
Orange	The CAN 2 system bus is being initialized.	-
Green	The CAN 2 system bus is being initialized.	-
Flashing green (0.5 Hz)	The CAN 2 system bus is currently in SCOM suspend mode.	-
Flashing green (1 Hz)	The CAN 2 system bus is currently in SCOM On mode.	-
Red	The CAN 2 system bus is off (BUS-OFF).	1. Check and correct the cabling of the CAN 2 system bus. 2. Check and correct the baud rate set for the CAN 2 system bus. 3. Check and correct the terminating resistors of the CAN 2 system bus.
Flashing red (1 Hz)	Warning on the CAN 2 system bus.	1. Check and correct the cabling of the CAN 2 system bus. 2. Check and correct the baud rate set for the CAN 2 system bus.

LED L3 (IEC program state)

LED **L3** indicates the **state** of the **IEC-61131 control program**.

State of L3	Diagnostics	Remedy
Green	IEC program is running.	-
Off	No program is loaded.	Load the program into the controller.
Flashing orange (1 Hz)	Program has stopped.	Bootloader update required (see chapter "SD memory card type OMH41B-T".)

LED L4 (controller state)

LED **L4** indicates the **firmware state** of the DH.21B/41B option.

State of the L4 LED	Diagnostics	Remedy
Flashing green (1 Hz)	The firmware of option DH.21B/41B is working properly.	-
Red	• No SD card inserted. • File system of the SD card is corrupt.	
Flashing orange (1 Hz)	Program has stopped.	Bootloader update required (see chapter "SD memory card types OMH41B-T. and OMC41B-T.")

LED L5 (User)

LED **L5** is freely programmable in the IEC program.

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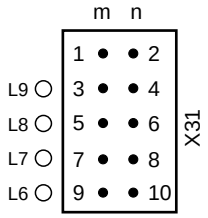
LEDs L6, L7, L8, L9 (DIO n/m)

LEDs **L6, L7, L8, L9** indicate the **state of the binary inputs and outputs (X31:3 - X31:10) n or m** (e.g. DIO2/3).



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State of L6, L7, L8, L9 LEDs	Diagnostics	Remedy
Off	No voltage present.	-
Green	Voltage at terminal n.	
Red	Voltage at terminal m.	
Orange	Voltage at terminals n and m.	

LED L10 (24 V / I/O OK)

LED**L10** indicates the **state** of the **voltage supply for binary inputs and outputs.**

State of the L10 LED	Diagnostics	Remedy
Green	Voltage supply for the binary inputs and outputs is OK.	-
Off	No voltage supply is present at the binary inputs and outputs.	1. Switch off the inverter in which the DH.21B/41B option is installed. 2. Check and correct the cabling of the binary inputs/outputs according to the electrical wiring diagram. 3. Check the current consumption of the connected actuators (max. current → "Technical Data" chapter). 4. Switch on the inverter in which the DH.21B/41B option is installed.
Orange	Voltage supply is present at the binary inputs and outputs. However, one of the following faults has occurred: • Overload on one or more binary inputs or outputs • Overtemperature of the output driver • Short circuit in at least one of the binary inputs or outputs	

4.7.8 DIP switch S1

You can use DIP switch S1 to set a default IP address for the Ethernet 2 connection (X37). This IP address will be applied with the next boot process.

S1 switch setting	Meaning
Up	IP parameter: • IP address: 192.168.10.4 • Subnet mask: 255.255.255.0 • Standard gateway: 1.0.0.0
Down	Addresses entered in the configuration file (see chapter "Functional description of terminals, DIP switches and LEDs")

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4.7.9 SD memory card types OMH41B-T. and OMC41B-T.

The SD memory card is required for operating the DH.21B/41B option. It stores the firmware, the IEC program and user data (e.g. recipes). You can use the memory card for data backup and automatic parameterization in the event of an axis replacement.

The SD memory card is available in 26 variants (T0 – T25). The different variants let you execute different technology functions. The technology level can be changed by changing the SD memory card.

OMH41B-T. type

With the SD memory card type OMH41B-T., the DH.21B/41B option is used as freely programmable controller. The SD memory card OMH41B-T. is inserted in the DH.21B/41B option. If the delivery also includes a compact controller, a MOVIAXIS® master module or an inverter with installed DH.21B/41B option, then the SD memory card is already installed in the DH.21B/41B option.

SD memory card OMH41B-T.		
Technology levels T0 – T25	**Part number**	**Description**
T0	1821 204 2	• Speed control management • Positioning, e.g. with the MPLCMotion_MDX library
T1	1821 205 0	Additional technology functions for T0: • Electronic cam • Electronic gear unit • Cam controller
T2	1821 206 9	A certain number of technology points is consumed depending on the functionality used. Refer to the relevant documentation for information on how many technology points are required.
T3	1821 967 5	
T4	1821 968 3	
T5	1821 969 1	
T6	1821 970 5	
T7	1821 971 3	
T8	1821 972 1	
T9	1821 974 8	
T10	1821 975 6	
T11	1822 860 7	
T12	1822 861 6	
T13	1822 862 3	
T14	1822 863 1	
T15	1822 865 8	
T16	1822 866 6	
T17	1822 867 4	
T18	1822 868 2	
T19	1822 869 0	
T20	1822 870 4	
T21	1822 871 2	
T22	1822 872 0	
T23	1822 873 9	
T24	1822 874 7	
T25	1822 875 5	

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Type OMC41B-T.

The SD memory card OMC41B-T.. lets you use the DH.21B/41B option as configurable application controller (CCU). A certain technology level is required for this purpose depending on the application module used. Refer to the documentation of the application module for information on the required technology level.

SD memory card OMC41B-T.		
Technology levels T0 – T25	**Part number**	**Description**
T0	1822 876 3	Single-axis applications: • Velocity specification • Bus positioning • Universal module, etc.
T1	1822 877 1	Technology functions: • Cam positioning • Synchronous operation, etc.
T2	1822 879 8	Multi-axis application modules: • Energy-efficient SRU • Sync crane, etc.
T3	1822 880 1	A certain number of technology points is consumed depending on the functionality used. Refer to the relevant documentation for information on how many technology points are required.
T4	1822 882 8	
T5	1822 883 6	
T6	1822 884 4	
T7	1822 885 2	
T8	1822 886 0	
T9	1822 887 9	
T10	1822 888 7	
T11	1822 889 6	
T12	1822 890 9	
T13	1822 891 7	
T14	1822 892 5	
T15	1822 893 3	
T16	1822 894 1	
T17	1822 896 8	
T18	1822 897 6	
T19	1822 898 4	
T20	1822 899 2	
T21	1822 901 8	
T22	1822 902 6	
T23	1822 903 4	
T24	1822 904 2	
T25	1822 905 9	

Bootloader update

A bootloader update is required when LEDs L3 and L4 flash orange at a frequency of 1 Hz after power-on. Proceed as follows:

- Do not switch off the power supply during the process.
- Press the reset button T1 on the front of the DH.21B/41B option for 3 seconds. When the bootloader update starts, only LED 4 is flashing.
- The bootloader update has been successful when L4 flashes green.

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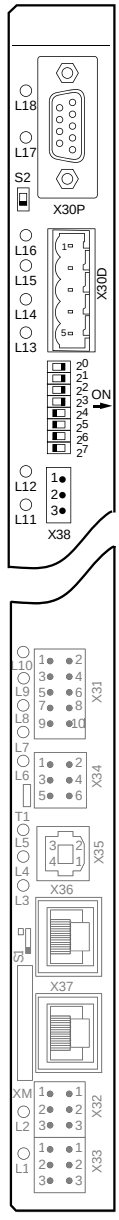
4.8 Installing the DHF21B/41B option

4.8.1 Functional description of terminals, DIP switches and LEDs

INFORMATION

The connections, which are identical for all the DH.21B/41B options, are described in the "Installing the DH.21B/41B option" chapter.

Front view DHF21B/41B option	Designation	LED DIP switch Terminal		Function
 2103268363	**LED**	**LED 18** **LED 17** **LED 16** **LED 15** **LED 14** **LED 13** **LED 12** **LED 11**	Run PROFIBUS Fault PROFIBUS Mod/Net Polled I/O Bit strobe I/O BUSOFF - -	PROFIBUS communication state PROFIBUS bus electronics state The two-color LEDs 13 – 16 indicate the current state of the fieldbus interface and the DeviceNet system Reserved Reserved
	X30P terminal: **PROFIBUS** **(Sub-D9)**	**X30P:9** **X30P:8** **X30P:7** **X30P:6** **X30P:5** **X30P:4** **X30P:3** **X30P:2** **X30P:1**	GND (M5V) RxD/TxD-N N.C. VP (P5V/100 mA) GND (M5V) CNTR-P RxD/TxD-P N.C. N.C.	Reference potential for PROFIBUS Signal receive transmit negative Terminal unassigned DC +5 V potential for bus terminator Reference potential for PROFIBUS PROFIBUS control signal for repeater Signal receive transmit positive Terminal unassigned Terminal unassigned
	X30D terminal: **DeviceNet** **(plug-in terminals)**	**X30D:1** **X30D:2** **X30D:3** **X30D:4** **X30D:5**	V– CAN_L DRAIN CAN_H V+	0V24 CAN_L DRAIN CAN_H 24 V
	DIP switch S2 **Switching between PROFIBUS and DeviceNet**	**S2**	Up Down	Fieldbus interface PROFIBUS (X30P) active Fieldbus interface DeviceNet (X30D) active

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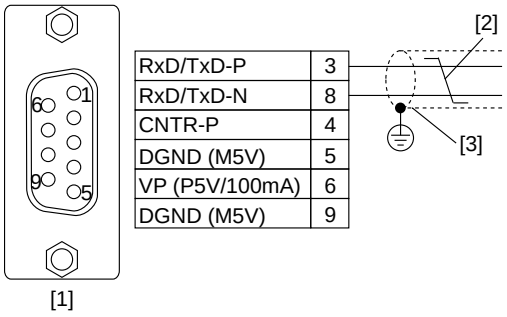
Front view DHF21B/41B option	Designation	LED DIP switch Terminal	Function
	For PROFIBUS mode: DIP switch for setting the PROFIBUS station address	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6**	Significance: 1 Significance: 2 Significance: 4 Significance: 8 Significance: 16 Significance: 32 Significance: 64
	For operation via DeviceNet: **DIP switch for setting the MAC-ID and baud rate**	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6** **2^7**	DIP switches 2^0 – 2^5 are used to set the MAC ID (**M**edia **A**ccess **C**ontrol **Id**entifier). The MAC ID represents the node address (address range 0 – 63) Setting the baud rate Setting the baud rate
	X38 terminal: **SEW safety bus** **(plug-in terminals)**	**X38:1** **X38:2** **X38:3**	Reserved Reserved Reserved
	Reset button T1	**T1**	Reset

4.8.2 Connecting PROFIBUS (X30P)

Connection to the PROFIBUS system is made using a 9-pin D-sub connector according to IEC 61158. The T-bus connection must be made using a connector with the corresponding configuration. The following figure shows the PROFIBUS connector that is connected to X30P of the DHF21B/41B option.



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[1] 9-pin D-sub connector
[2] Signal line, twisted
[3] Conductive connection over a large area between plug housing and shield

Connecting the DHF21B/41B controller to PROFIBUS

The DHF21B/41B option is usually connected to the PROFIBUS system using a shielded twisted-pair cable. Observe the maximum supported transmission rate when selecting the bus connector.

The twisted-pair cable is connected to the PROFIBUS connector at pin 3 (RxD/TxD-P) and pin 8 (RxD/TxD-N). Communication takes place using these two pins. The RS485 signals RxD/TxD-P and RxD/TxD-N must all be connected to the same contacts in all PROFIBUS stations. Else, the bus components cannot communicate via the bus medium.

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The PROFIBUS interface sends a TTL control signal for a repeater or fiber optic adapter (reference = pin 9) via pin 4 (CNTR-P).

Baud rates greater than 1.5 MBaud

Operating the DHF21B/41B option with baud rates > 1.5 MBaud is only possible with special 12 MBaud PROFIBUS connectors.

Bus termination

You need not equip the DHF21B/41B option with bus terminating resistors. This means the PROFIBUS system can be put into operation more easily and the number of error sources during installation is reduced.

When the DHF21B/41B option is located at the start or end of a PROFIBUS segment and when there is only one PROFIBUS cable connected to the DHF21B/41B option, you must use a plug with an integrated bus terminating resistor.

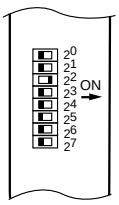
Switch on the bus terminating resistors for this PROFIBUS connector.

Setting the station address

To set the PROFIBUS station address, use DIP switches 2^0 – 2^6 on the DHF21B/41B option.

The DHF21B/41B option supports address range 0 – 125.

DHF41B



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The default setting for the station address is 4:

2^0 → Significance: 1 × 0 = 0
2^1 → Significance: 2 × 0 = 0
2^2 → Significance: 4 × 1 = 4
2^3 → Significance: 8 × 0 = 0
2^4 → Significance: 16 × 0 = 0
2^5 → Significance: 32 × 0 = 0
2^6 → Significance: 64 × 0 = 0

Any change made to the PROFIBUS station address during ongoing operation does not take effect immediately. You have to switch the compact controller or the inverter in which DHF21B/41B option is installed on and off again for the changes to take effect (power +24 V off/on).

4.8.3 LEDs in PROFIBUS mode

LED L17 (PROFIBUS fault)

LED **L17 (PROFIBUS fault**) indicates that communication via the PROFIBUS interface is working properly.

State of the L17 LED	Diagnostics	Remedy
Off	• The DHF21B/41B option exchanges data with the PROFIBUS-DP master (data exchange state).	-
Red	• Connection to the DP master has failed. • The DHF21B/41B option does not detect the PROFIBUS baud rate. • Bus interruption. • PROFIBUS-DP master not in operation.	• Check the PROFIBUS connection of the unit. • Check project planning of the PROFIBUS DP master. • Check all the cables in the PROFIBUS network.
Flashing red (1 Hz)	• The DHF21B/41B option does not detect the baud rate. However, the DP master does not address the DHF21B/41B option. • The DHF21B/41B option was either not configured in the DP master or it was configured incorrectly.	• Check and correct the PROFIBUS station address set in the DHF21B/41B option and in the configuration software of the DP master. • Check and correct the configuration of the DP master. • Use the GSD file **SEW_6007.GSD** with the designation *MOVI-PLC* for configuration.

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LED L18 (Run PROFIBUS)

LED **L18 (Run PROFIBUS)** indicates that the PROFIBUS electronics (hardware) is working properly.

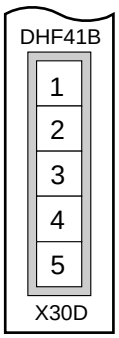
State of the L18 LED	Diagnostics	Remedy
Green	• PROFIBUS hardware OK.	-
Flashing green (1 Hz)	• The PROFIBUS station address set on the DIP switches exceeds 125. If the PROFIBUS station address is set to a value higher than 125, the DHF21B/41B option will use PROFIBUS station address 4.	1. Check and correct the PROFIBUS station address set on the DIP switches. 2. Switch on all inverters again. The modified PROFIBUS address will only take effect after a restart.

4.8.4 Connecting DeviceNet (X30D)

The connection to the DeviceNet fieldbus system is in preparation.

Pin assignment

The assignment of connecting terminals is described in the DeviceNet specification (Volume I, Appendix A).



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The DHF21B/41B option is opto-decoupled on the driver side in accordance with the DeviceNet specification (Volume I, Chapter 9). This means the CAN bus driver must be powered with 24 V voltage via the bus cable. The cable to be used is also described in the DeviceNet specification (Volume I, Appendix B). The connection must be made according to the color code specified in the following table.

Pin no.	Signal	Meaning	Color coding
1	V–	0V24	BK
2	CAN_L	CAN_L	BU
3	DRAIN	DRAIN	blank
4	CAN_H	CAN_H	WH
5	V+	24 V	RD

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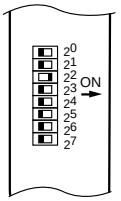
Setting the station address

To set the DeviceNet station address, use DIP switches 2^0 – 2^5 on the DHF21B/41B option. The DHF21B/41B option supports address range 0 – 63.

INFORMATION

Always de-energize the DHF21B/41B option before changing the DIP switch setting. DIP switch settings are adopted during initialization only.

DHF41B



2^0 – 2^5 = MAC ID setting
2^6 – 2^7 = Baud rate setting

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Setting the MAC ID

The MAC ID (**M**edia **A**ccess **C**ontrol **Id**entifier) is set on the DHF21B/41B option using DIP switches 2^0 – 2^5 in a binary coded manner. The MAC ID represents the node address of the DHF21B/41B option. The DHF21B/41B option supports address range 0 – 63.

Setting the baud rate

The baud rate is set using DIP switches 2^6 and 2^7.

DIP switch		Baud rate
2^6	2^7	
0	0	125 kBaud
1	0	250 kBaud
0	1	500 kBaud
1	1	Invalid

A maximum of 64 DeviceNet data words can be exchanged between the DeviceNet module and the DHF21B/41B option. The number is set using the DeviceNet scanner.

4.8.5 LEDs in DeviceNet mode

The DHF21B/41B option card comes equipped with four two-color LEDs for diagnostics of the DeviceNet system. They indicate the current state of the DHF21B/41B option and the DeviceNet system. The unit state indicated by the LEDs is described in the "Error diagnostics" section.

LED		
Designation	**Abbreviation**	**Complete LED designation**
L16	MOD/NET	Module/Network state
L15	PIO	Polled I/O
L14	BIO	Bit-strobe IO
L13	BUS FAULT	BUS FAULT

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LED L16 (Mod/Net)

The function of LED **L16 (Mod/Net** = Module/network state) described in the following table is specified in the DeviceNet specification.

State of the L16 LED	State	Meaning
Off	Not switched on/offline	• Unit is offline • Unit performs DUP MAC check • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• The unit is online and no connection has been established • DUP-MAC check performed successfully • A connection has not yet been established with a master • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • Connection to a master has been established • Connection is active (established state)
Flashing red (1 s cycle)	Minor error or connection timeout	• A correctable error has occurred • Polled I/O and/or bit strobe I/O connections are in timeout state • DUP-MAC check has detected an error
Red light	Critical error or critical link failure	• A correctable error has occurred • BusOff • DUP-MAC check has detected an error

LED L15 (PIO)

LED **L15 (Polled I/O)** monitors the polled I/O connection.

State of the L15 LED	State	Meaning
Flashing green (125 ms cycle)	DUP-MAC check	Unit is performing DUP-MAC check
Off	Not switched on/offline but not DUP-MAC check	• Unit is offline • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• Unit is online • DUP-MAC check performed successfully • A polled IO connection is being established with a master (configuring state) • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • A polled I/O connection has been established (established state)
Flashing red (1 s cycle)	Minor error or connection timeout	• Invalid baud rate setting via DIP switches • A correctable error has occurred • Polled I/O connection is in timeout state
Red light	Critical error or critical link failure	• An error that cannot be corrected has occurred • BusOff • DUP-MAC check has detected an error

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LED L14 (B/O)

LED **L14 (Bit-strobe I/O)** monitors the bit-strobe I/O connection.

State of the L14 LED	State	Meaning
Flashing green (125 ms cycle)	DUP-MAC check	Unit is performing DUP-MAC check
Off	Not switched on/offline but not DUP-MAC check	• Unit is offline • Unit is switched off
Flashing green (1 s cycle)	Online and in operational mode	• Unit is online • DUP-MAC check performed successfully • A BIO connection is being established with a master (configuring state) • Missing, incorrect or incomplete configuration
Lights up green	Online, operational mode and connected	• Online • A BIO connection has been established (established state)
Flashing red (1 s cycle)	Minor error or connection timeout	• Invalid number of process data is set via DIP switches • A correctable error has occurred • Bit-strobe I/O connection is in timeout state
Red light	Critical error or critical link failure	• An error that cannot be corrected has occurred • BusOff • DUP-MAC check has detected an error

LED L13 (BUS FAULT)

LED **L13 (BUS FAULT)** indicates the physical state of the bus node.

State of the L13 LED	State	Meaning
Off	NO ERROR	The number of bus errors is in the normal range (error active status).
Flashing red (125 ms cycle)	BUS WARNING	The unit is performing a DUP-MAC check and cannot send any messages because no other stations are connected to the bus (error passive state)
Flashing red (1 s cycle)		The number of physical bus errors is too high. No more error telegrams are actively written to the bus (error passive state).
Red light	BUS ERROR	• BusOff state • The number of physical bus errors has increased despite switchover to error-passive state. Access to the bus is switched off.
Yellow light	POWER OFF	External voltage supply has been turned off or is not connected.

4.8.6 Connecting SEW safety bus (X38)

Connection to the SEW safety bus system is in preparation.

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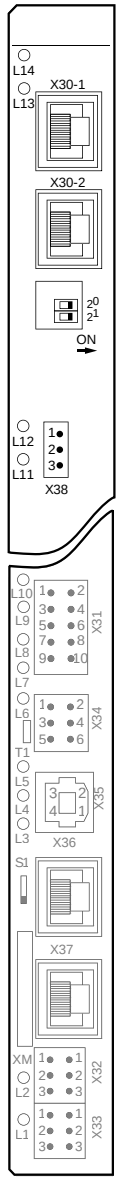
4.9 Installing the DHR21B/41B option

4.9.1 Functional description of the terminals, DIP switches and LEDs

INFORMATION

The connections, which are identical for all the DH.21B/41B options, are described in the "Installing the DH.21B/41B option" chapter.

Front view DHR21B/41B option	Designation	LED DIP switch Terminal		Function
 2104903179	**LED**	**L14** **L13** **L14** **L13** **L12** **L11**		In EtherNet/IP and Modbus/TCP mode: MODULE STATUS NETWORK STATUS In PROFINET mode: RUN BUS FAULT Reserved Reserved
	X30-1: **Ethernet 3** **(RJ45 socket)**	**X30-1**		Standard Ethernet assignment
	X30-2: **Ethernet 4** **(RJ45 socket)**	**X30-2**		
	DIP switches 2^0, 2^1	**2^0** **2^1**	ON (right) OFF (left) ON (right) OFF (left)	Default IP address (192.168.10.4) Stored IP address or DHCP EtherNet/IP / Modbus TCP/IP PROFINET
	X38 terminal: **SEW safety bus** **(plug-in terminals)**	**X38:1** **X38:2** **X38:3**		Reserved Reserved Reserved

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4.9.2 Connecting the DHR21B/41B controller to the Ethernet network

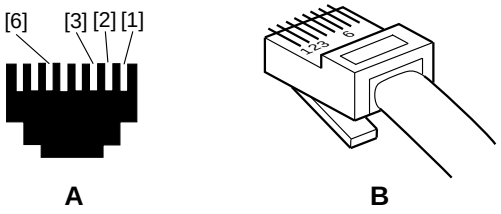
To connect DHR21B/41B to the Ethernet network, connect Ethernet interface X30-1 or X30-2 (RJ45 plug connector) to the other network stations using a category 5, class D twisted-pair cable in accordance with IEC 11801 edition 2.0. The integrated switch supports you in implementing a line topology and offers auto-crossing functions.

INFORMATION

- According to IEC 802.3, the maximum cable length for 10/100 MBd Ethernet (10BaseT / 100BaseT), e.g. between two network stations, is 100 m.
- We recommend that you do not directly connect non-SEW end devices to the DFR21B/41B option in order to minimize the load on the end devices in EtherNet/IP networks caused by undesired multicast data traffic. Connect non-SEW devices via a network component that supports the IGMP snooping functionality (e.g. managed switch).
  Managed switches with IGMP snooping functionality are not required for PROFINET IO and Modbus/TCP networks.

Pin assignment

Use prefabricated, shielded RJ45 plug connectors compliant with IEC 11801 edition 2.0, category 5.



2104906251

A = View from front
B = View from back
[1] Pin 1 TX+ Transmit Plus
[2] Pin 2 TX– Transmit Minus
[3] Pin 3 RX+ Receive Plus
[4] Pin 6 RX– Receive Minus

4.9.3 Setting DIP switches 2^0 and 2^1

INFORMATION

The setting of the "2^0" and "2^1" DIP switches is only adopted with a power-on reset (switching on and off the DC 24 V supply voltage).

DIP switch 2^0 (Def IP)

If the switch "2^0" is set to "1" (= right = ON), the following default IP address parameters are set when switching on the DC 24 V supply voltage:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Default gateway: 1.0.0.0 for EtherNet/IP (192.168.10.4 for PROFINET)
- P785 DHCP / Startup configuration: Stored IP parameters (DHCP is disabled)

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DIP switch 2^1 (protocol)

DIP switch "2^1" is used to set the fieldbus protocol that is currently used.

- 2^1 = "1" (= right = ON): The EtherNet/IP / Modbus TCP/IP fieldbus protocol is active
- 2^1 = "0" (= left = OFF): The PROFINET fieldbus protocol is active.

4.9.4 The integrated Ethernet switch

You can use the integrated Ethernet switch to achieve line topologies known from the fieldbus technology via X30-1 and X30-2. Other bus topologies, such as star or tree, are also possible. Ring topologies are not supported.

INFORMATION

The number of industrial Ethernet switches connected in line impacts the telegram runtime. If a telegram passes through the units, the telegram runtime is delayed by the store & forward function of the Ethernet switch:

- For a telegram length of 64 bytes by approximately 10 µs (at 100 Mbit/s)
- For a telegram length of 1500 bytes by approximately 130 µs (at 100 Mbit/s)

This means that the more units a telegram has to pass through, the higher the telegram runtime is.

Auto-crossing

The two ports leading out of the Ethernet switch have auto-crossing functionality. This means that they can use both patch and cross-over cables to connect to the next Ethernet station.

Auto-negotiation

The baud rate and the duplex mode are negotiated by both Ethernet nodes when establishing the connection. For this purpose, both Ethernet ports of the EtherNet/IP connection support an auto-negotiation functionality and work with a baud rate of either 100 Mbit or 10 Mbit in full duplex or half-duplex mode.

Notes on multicast handling

- The integrated Ethernet switch does not provide a filter function for Ethernet multicast telegrams. Multicast telegrams that are usually sent in Ethernet/IP networks from the adapters to the scanners (PLC) are passed on to all switch ports.
- IGMP snooping (managed switch) is not supported.
- SEW-EURODRIVE therefore recommends to connect the DHR21B/41B option in EtherNet/IP networks only with network components that support IGMP snooping (e.g. managed switch) or that have safety mechanisms integrated against excess multicast load (e.g. units from SEW-EURODRIVE). Units that do not have this integrated function can fail due to high network loads. This restriction does not apply to PROFINET IO or Modbus/TCP networks.

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4.9.5 TCP / IP addressing and subnets

Introduction

The settings for the address of the IP protocol are made using the following parameters:

- MAC address
- IP address
- Subnet mask
- Standard gateway

The addressing mechanisms and subdivision of the IP networks into subnets are explained in this chapter to help you set the parameters correctly.

MAC address

The MAC address (Media Access Controller) is the basis for all address settings. The MAC address is a worldwide unique 6-byte value (48 bits) assigned to the Ethernet device. SEW Ethernet devices have the MAC address 00-0F-69-xx-xx-xx. The MAC address is difficult to handle for large networks. This is why freely assignable IP addresses are used.

IP address

The IP address is a 32-bit value that uniquely identifies a station in the network. An IP address is represented by 4 decimal numbers separated by decimal points.

Example: 192.168.10.4

Each decimal number stands for one byte (= 8 bits) of the address and can also be represented using binary code (see following table).

Byte 1		Byte 2		Byte 3		Byte 4
11000000	.	10101000	.	00001010	.	00000100

The IP address comprises a network address and a station address (see following table).

Network address	Station address
192.168.10	4

The part of the IP address that denotes the network and the part that identifies the station is determined by the network class and the subnet mask.

Station addresses cannot consist of only zeros or ones (binary) because they represent the network itself or a broadcast address.

Network classes

The first byte of the IP address determines the network class and as such represents the division into network addresses and station addresses.

Value range Byte 1	Network class	Complete network address (Example)	Meaning
0 – 127	A	10.1.22.3	10 = Network address 1.22.3 = Station address
128 – 191	B	172.16.52.4	172.16 = Network address 52.4 = Station address
192 – 223	C	192.168.10.4	192.168.10 = Network address 4 = Station address

This rough division is not sufficient for a number of networks. They also use an explicit, adjustable subnet mask.

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Subnet mask

A subnet mask is used to divide the network classes into even finer sections. Like the IP address, the subnet mask is represented by 4 decimal numbers separated by decimal points.

Example: 255.255.255.128

Each decimal number stands for one byte (= 8 bits) of the subnet mask and can also be represented using binary code (see following table).

Byte 1		Byte 2		Byte 3		Byte 4
11111111	.	11111111	.	11111111	.	10000000

If you compare the IP addresses with the subnet masks, you see that in the binary representation of the subnet mask all ones determine the network address and all the zeros determine the station address (see following table).

		Byte 1		Byte 2		Byte 3		Byte 4
IP address	decimal	192	.	168	.	10	.	129
	binary	11000000	.	10101000	.	00001010	.	10000001
Subnet mask	decimal	255	.	255	.	255	.	128
	binary	11111111	.	11111111	.	11111111	.	10000000

The class C network with the address 192.168.10. is further subdivided into 255.255.255.128 using the subnet mask. Two networks are created with the address 192.168.10.0 and 192.168.10.128.

The following station addresses are permitted in the two networks:

- 192.168.10.1 ... 192.168.10.126
- 192.168.10.129 ... 192.168.10.254

The network stations use a logical AND operation for the IP address and the subnet mask to determine whether there is a communication partner in the same network or in a different network. If the communication partner is in a different network, the standard gateway is addressed for passing on the data.

Standard gateway

The standard gateway is also addressed via a 32-bit address. The 32-bit address is represented by 4 decimal numbers separated by decimal points.

Example: 192.168.10.1

The standard gateway establishes a connection to other networks. In this way, a network station that wants to address another station can use a logical AND operation with the IP address and the subnet mask to determine whether the required station is located in the same network. If this is not the case, the station addresses the standard gateway (router), which must be part of the actual network. The standard gateway then takes on the job of transmitting the data packages.

DHCP (Dynamic Host Configuration Protocol)

Instead of setting the 3 parameters IP address, subnet mask and standard gateway manually, they can be assigned automatically by a DHCP server in the Ethernet network.

This means the IP address is assigned from a table, which contains the allocation of MAC address to IP address.

Parameter P785 indicates whether the DHR21B/41B option expects the IP parameters to be assigned manually or via DHCP.

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4.9.6 LEDs in PROFINET mode

LED L13 (BUS FAULT)

The LED **L13 (BUS FAULT)** indicates the PROFINET state.

State of the L13 LED	Cause of error	Remedy
Off	• PROFINET IO device is currently exchanging data with the PROFINET IO controller (Data Exchange).	-
Flashing green **Flashing green/ red**	• The flashing function in the PROFINET IO controller configuration is activated to visually localize the stations.	-
Red	• Connection to the PROFINET IO controller has failed. • PROFINET IO device does not detect a link. • Bus interruption • PROFINET IO controller is not in operation	• Check the PROFINET connection of the DHR21B/41B option • Check the PROFINET IO controller • Check the cabling of your PROFINET network
Yellow **Flashing yellow**	• The STEP 7 hardware configuration contains a module that is not permitted.	• Switch the STEP 7 hardware configuration to ONLINE and analyze the component states of the slots in the PROFINET IO device.

LED L14 (RUN)

LED **L14 (RUN)** indicates that the bus electronics are operating correctly.

State of the L14 LED	Cause of error	Remedy
Green	• DHR21B/41B hardware OK. • Proper operation	–
Off	• DHR21B/41B is not ready for operation.	• Switch the unit on again. Consult SEW service if the error occurs again.
Red	• Error in the DHR21B/41B hardware	
Flashing green	• Hardware of the DHR21B/41B does not boot up.	
Flashing yellow		• Switch the unit on again. Set default IP address parameter using DIP switch S1. Consult SEW service if the error occurs again.
Yellow		• Switch the unit on again. Consult SEW service if the error occurs again.

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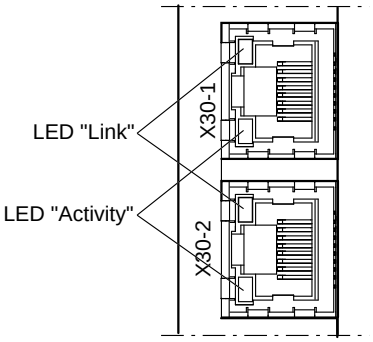
Link/Activity LED

The two LEDs **Link (green)** and **Activity (yellow)** integrated in the RJ45 plug connectors (X30-1, X30-2) display the state of the Ethernet connection.



2104908939

LED/state	Meaning
Link/green	There is an Ethernet connection.
Link/off	There is no Ethernet connection.
Activity/yellow	Data is currently being exchanged via Ethernet.

4.9.7 Setting IP address parameters via DCP

Initial startup

For PROFINET IO, the IP address parameters are determined via the "DCP" protocol (**D**iscovery and **C**onfiguration **P**rotocol). DCP operates with device names. The device name uniquely identifies a PROFINET IO station in the network. It is identified with the PROFINET IO controller when configuring the station and is set using the project planning software on the PROFINET IO device. With the aid of the device name, the controller identifies the device during startup and transfers the corresponding IP address parameters. Settings directly on the slave are no longer required.

Resetting IP address parameters

If you do not know the IP address parameters and cannot access the inverter using the serial interface or the DBG60B keypad, you can reset the IP address parameters to the default values using DIP switch "2^0".

This action resets the DHR21B/41B option to the following default values:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Default gateway: 1.0.0.0
- PROFINET device name: PNETDeviceName_MACID

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the 24 V DC supply voltage and the line voltage.
- On the DHR21B/41B option, set DIP switch "2^0" to "1" (= right = ON).
- Switch the DC 24 V supply voltage and the line voltage back on.
- Wait until the DHR21B/41B option has booted up. This is indicated by the green "Run" LED.

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You can now access the inverter via the IP address 192.168.10.4. Proceed as follows to set new IP address parameters:

- Start MOVITOOLS® MotionStudio.
- Select the required address parameters.
- On the DHR21B/41B option, set DIP switch "2^0" to "0" (= left = OFF).
- The new address parameters are adopted after the unit is switched off and switched on again.

4.9.8 LEDs in EtherNet/IP and Modbus/TCP mode

LEDs L13 and L14 of the DHR21B/41B indicate the current state of the DHR21B/41B option and the EtherNet/IP or Modbus/TCP system.

LED L13

LED **L13 (NETWORK STATUS).**

State of the L13 LED	Meaning
Off	The DHR21B/41B option does not yet have any IP parameters.
Flashing green/red	The DHR21B/41B option card performs an LED test.
Flashing green	There is no controlling IO connection.
Green	There is a controlling EtherNet/IP IO connection.
Red	Conflict detected in the assigned IP addresses. Another station in the network uses the same IP address.
Flashing red	The previously established controlling IO connection is in timeout state. The state is reset by restarting communication.

LED L14

LED **L14 (MODULE STATUS)**.

State of the L14 LED	Meaning
Off	The DHR21B/41B option is not supplied with voltage or is defective
Flashing green	• If the NETWORK STATUS LED is off at the same time, the TCP/IP stack of the DHR21B/41B option will be started. If this state persists and DHCP is activated, the DHR21B/41B option will wait for data from the DHCP server. • If the NETWORK STATUS LED is flashing green at the same time, the application of the DHR21B/41B option is started.
Flashing green/red	The DHR21B/41B option performs an LED test.
Green	Indicates the standard operating state of the DHR21B/41B option
Red	The DHR21B/41B option is in fault state.
Flashing red	Conflict detected in the assigned IP addresses. Another station in the network uses the same IP address.

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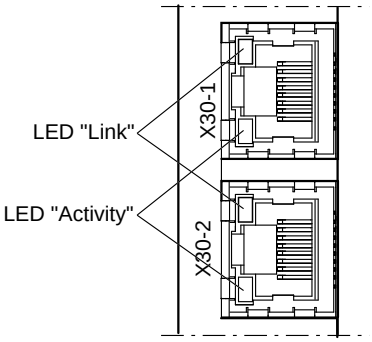
LED Link / Activity

The two LEDs **Link (green)** and **Activity (yellow)** integrated in the RJ45 plug connectors (X30-1, X30-2) display the state of the Ethernet connection.



2104908939

LED/state	Meaning
Link/green	There is an Ethernet connection.
Link/off	There is no Ethernet connection.
Link/flashes	Function for localizing in the SEW Address Editor (see chapter "Operating the MOVITOOLS MotionStudio®")
Activity/yellow	Data is currently being exchanged via Ethernet.

4.9.9 Setting IP address parameters

INFORMATION

- DHCP remains disabled when you reset the DIP switch "2^0" to "0" (= left = OFF). You can re-activate DHCP via the EtherNet/IP TCP/IP interface object, parameter P785 or the DHCP server by Rockwell Automation.
- DHCP remains active when resetting the values to the default setting (*P802 Factory setting*).

Initial startup

If the EtherNet/IP and MODBUS TCP protocol is set using the DIP switch, the default protocol for the DHR21B/41B option will be "DHCP" (**D**ynamic **H**ost **C**onfiguration **P**rotocol). This means that the option expects its IP address parameters from a DHCP server.

INFORMATION

There is a free DHCP server available on the Rockwell Automation homepage. The tool is known as "BOOTP Utility" and can be downloaded from the following website:

Once the DHCP server has been configured and the settings have been made for the subnet mask and the standard gateway, the DHR21B/41B option must be inserted in the assignment list of the DHCP server. In doing so, the MAC ID of the DHR21B/41B option is allocated a valid IP address.

INFORMATION

The configured IP address parameters are adopted permanently by the parameter set when DHCP is deactivated after the IP address has been assigned.

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Changing the IP address parameters after successful initial startup

If the DHR21B/41B was started using a valid IP address, you can also access the IP address parameters via Ethernet interface.

You can change the IP address parameters via Ethernet by one of the following methods:

- Using the MOVITOOLS® MotionStudio software
- Using the EtherNet/IP TCP/IP interface object (see section "EtherNet/IP CIP object directory")
- Using the SEW Address Editor

You can also change IP address parameters via the other interface of the DHR21B/41B option.

If the IP address parameters are assigned to the DHR21B/41B option by a DHCP server, you can only change the parameters by adjusting the settings of the DHCP server.

The methods listed above for changing the IP address parameters only come into effect once the supply voltage (DC 24 V) has been switched off and back on again.

Deactivating/ activating the DHCP

The type of IP address allocation is determined by the setting of the attribute *Configuration Control* of the EtherNet/IP TCP/IP interface object. The value is displayed or modified in the *P785 DHCP/Startup Configuration* parameter.

- "Stored IP parameters" setting

  The stored IP address parameters are used.

- "DHCP" setting

  The IP address parameters are requested by a DHCP server.

  If you use the DHCP server from Rockwell Automation, you can activate or deactivate the DHCP by clicking a button. In this case, an EtherNet/IP telegram is sent to the TCP/IP interface object of the station that is being addressed.

Resetting IP address parameters

If you do not know the IP address parameters and there is no serial interface or DBG60B keypad for reading the IP address, you can reset the IP address parameters to the default values using the DIP switch "2^0".

This action resets the DHR21B/41B option to the following default values:

- IP address: 192.168.10.4
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.10.4
- DHCP / Startup Configuration: Stored IP parameters (DHCP is disabled)

Proceed as follows to reset the IP address parameters to the default values:

- Switch off the 24 V DC supply voltage and the line voltage.
- On the DHR21B/41B option, set DIP switch "2^0" to "1" (= right = ON).
- Switch the DC 24 V supply voltage and the line voltage back on.

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SEW Address Editor

You can also use the SEW Address Editor to access the IP settings of DHR21B/41B without the Ethernet settings of the PC and DHR41B having to match.

The IP settings of all SEW units can be made and displayed in the local subnet using the Address Editor in MOVITOOLS® MotionStudio.

- In this way, you can determine the PC settings required to provide for an access with the required diagnostics and engineering tools via Ethernet while the installation is in progress.
- When starting up a unit, the IP settings can be assigned to the DHR21B/41B option without having to change network connections or PC settings.

4.10 Engineering interfaces of the DH.21B/41B option

The engineering access to the DH.21B/41B option is made via Ethernet 2 interface (X37) or USB interface (X35). With option DHF21B/41B, engineering access is possible via PROFIBUS (X30P). With option DHR21B/41B, engineering access is possible via Ethernet (X30-1/2).

INFORMATION

Refer to the following publications for more information:

- "DHR21B/41B Controller Fieldbus Interfaces EtherNet/IP, Modbus TCP/IP and PROFINET IO" manual
- "DHF21B/41B Controller Fieldbus Interfaces DeviceNet and PROFIBUS DP-V1" manual

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5 Project Planning and Startup with MOVITOOLS® MotionStudio

5.1 About MOVITOOLS® MotionStudio

5.1.1 Tasks

The software package enables you to perform the following tasks:

- Establishing communication with units
- Executing functions with the units

5.1.2 Establishing communication with other units

The SEW Communication Server is integrated into the MOVITOOLS® MotionStudio software package for establishing communication with the units.

The SEW Communication Server allows you to create **communication channels**. Once the channels are established, the units communicate via these channels using their communication options. You can operate up to four communication channels at the same time.

MOVITOOLS® MotionStudio supports the following types of communication channels:

- Serial (RS-485) via interface adapters
- System bus (SBus) via interface adapters
- Ethernet
- EtherCAT
- Fieldbus (PROFIBUS DP/DP-V1)
- Tool Calling Interface

The available channels can vary depending on the units and their communication options.

5.1.3 Executing functions with the units

The software package offer uniformity in executing the following functions:

- Parameterization (for example in the parameter tree of the unit)
- Startup
- Visualization and diagnostics
- Programming

The following basic components are integrated into the MOVITOOLS® MotionStudio software package, allowing you to use the units to execute functions:

- MotionStudio
- MOVITOOLS®

All functions communicate using **tools**. MOVITOOLS® MotionStudio provides the right tools for every unit type.

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5.2 First steps

5.2.1 Starting the software and creating a project

Proceed as follows to start MOVITOOLS® MotionStudio and create a project:

1. Start the MOVITOOLS® MotionStudio from the Windows start menu via:

   [Start]/[Programs]/[SEW]/[MOVITOOLS-MotionStudio]/[MOVITOOLS-MotionStudio]

2. Create a project with name and storage location.

5.2.2 Establishing communication and scanning the network

Proceed as follows to establish a communication with MOVITOOLS® MotionStudio and scan your network:

1. Set up a communication channel to communicate with your units.

   For detailed information on how to configure a communication channel, see the section regarding the relevant communication type.

2. Scan your network (unit scan). Press the [Start network scan] button [1] in the toolbar.

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3. Select the unit you want to configure.
4. Right-click to open the context menu.

   As a result you will see a number of unit-specific tools to execute various functions with the units.

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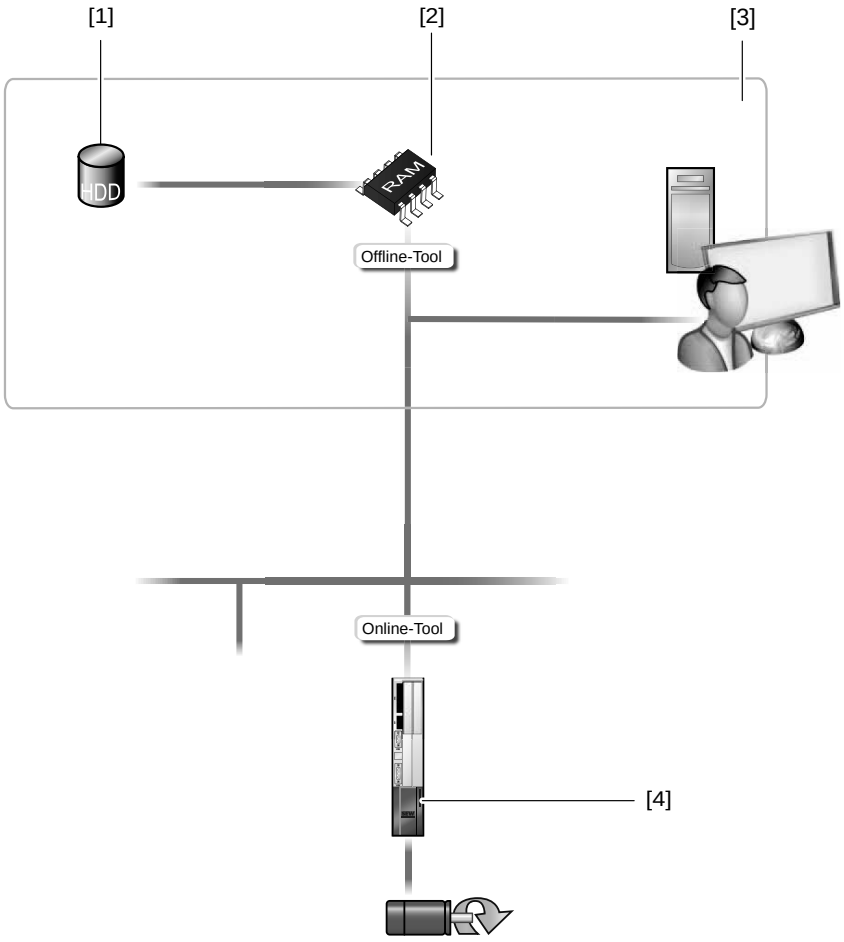
5.3 Connection mode

5.3.1 Overview

MOVITOOLS® MotionStudio differentiates between "online" and "offline" communication mode. You can select the communication mode yourself. Depending on the selected communication mode, you can choose offline or online tools specific to your unit.

The following figure illustrates the two types of tools:



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[1] Hard drive of the engineering PC
[2] RAM of the engineering PC
[3] Engineering PC
[4] Unit

Tools	Description
Offline tools	Changes made using offline tools affect **"ONLY"** the RAM [2]. • Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3]. • Perform the "Download (PC->unit)" function if you want to transfer the changes to your unit [4] as well.
Online tools	Changes made using online tools affect **"ONLY"** the unit [4]. • Perform the "Upload (unit->PC)" function if you want to transfer the changes to your RAM. • Save your project so that the changes can be stored on the hard disk [1] of your engineering PC [3].

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INFORMATION

- The "online" communication mode is **NOT** a response message which informs you that you are currently connected to the unit or that your unit is ready for communication. Should you require this feedback, observe section "Setting the cyclical accessibility test" in the online help (or the manual) of MOVITOOLS® MotionStudio.
- Project management commands (such as download and upload), the online unit status, and the unit scan work independent of the set communication mode.
- MOVITOOLS® MotionStudio starts up in the communication mode that you set before you closed down.

5.3.2 Selecting the communication mode (online or offline)

Proceed as follows to select the communication mode:

1. Select the communication mode:
   - "Switch to online mode" [1] for functions (online tools) that should directly influence the unit.
   - "Switch to offline mode" [2] for functions (offline tools) that should influence your project.

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[1] "Switch to online mode" icon
[2] "Switch to offline mode" icon

2. Select the unit node.
3. Right-click to open the context menu and display the tools for configuring the unit.

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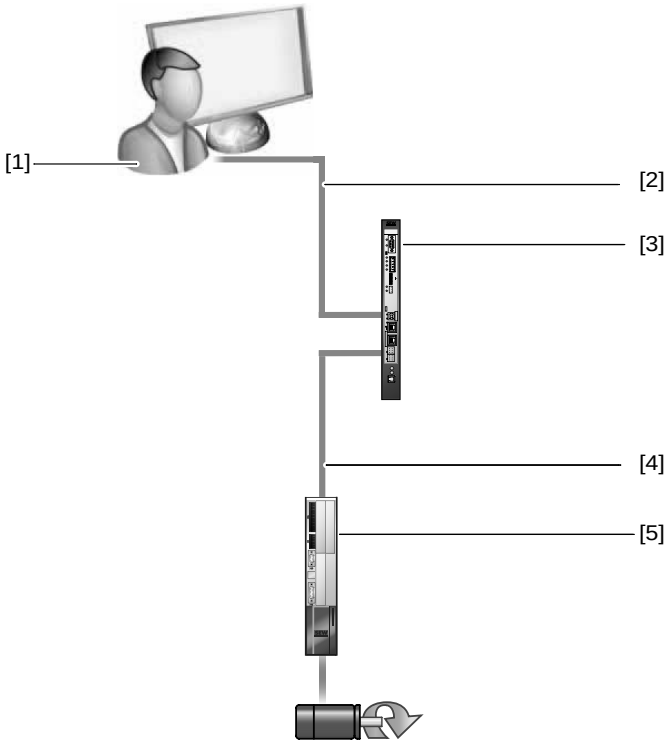
5.4 Communication via USB

5.4.1 Connecting the unit with the PC via USB

The illustration shows how the unit (in the example a DH.21B/41B controller [3])) is connected with the PC [1] using a USB connection cable [2]. It also shows how the controller [3] is connected with the lower-level unit [5] via SBus (CAN).



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[1] PC with USB interface
[2] USB connection cable
[3] Controller (DHF41B for example)
[4] SBus connection (CAN based) between controller and lower-level unit
[5] Lower-level unit (MOVIAXIS® in this example)

Do the following to connect the DH.21B/41B controller with the PC and the lower-level unit:

1. Insert the USB-**A** connector of the USB cable [2] into a free USB port on your PC [1].
2. Insert the USB-**B** connector of the USB cable [2] into the USB port on your DH.21B/41B option [3].
3. Connect the SBus interface of the controller [3] with the SBus interface of the lower-level unit [5].

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5.4.2 Installing the driver

Before you can communicate with the unit via USB, you have to install the required driver file from the installation path of MOVITOOLS® MotionStudio.

Follow the instructions below to install the driver for USB communication:

1. Connect the unit to a free USB port on your PC.

   Your PC will detect the new hardware and launch the hardware wizard.
2. Follow the instructions of the hardware wizard.
3. Click on [Browse] and go to the MOVITOOLS® MotionStudio installation folder.
4. Enter the following path:

   `"..\Program Files\SEW\MotionStudio\Driver\SEW_USBWIN32_051120"`
5. To install the driver, click [Next].

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5.4.3 Configuring USB communication

You need a USB connection between your PC and the unit you want to configure.

Proceed as follows to configure USB communication:

1. Click on "Configure communication plugs" [1] in the toolbar.

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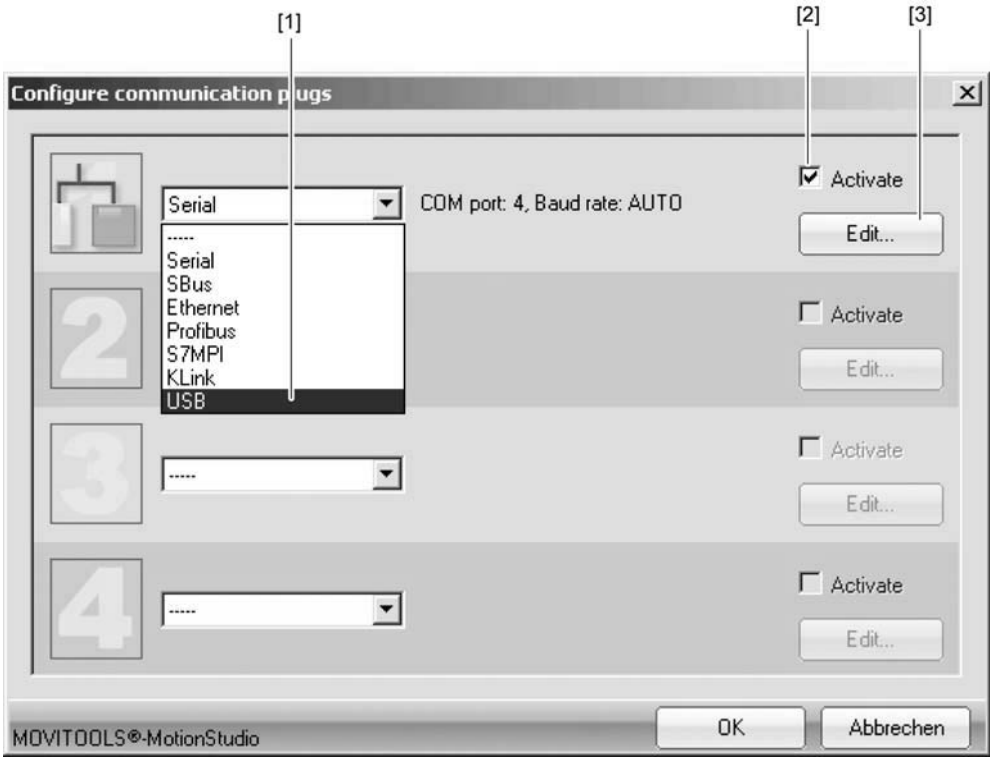
[1] "Configure communication plugs" icon

This will open the "Configure communication plugs" window.



1679056651

[1] "Type of communication" dropdown menu
[2] "Activate" checkbox
[3] [Edit] button

2. From the dropdown menu [1], select "USB" as the communication type.

   In the example, "USB" is activated as the communication type for the first communication channel [2].

3. Press the [Edit] button [3] on the right side of the "Configure communication plugs" window.

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This will display the settings for the "USB" communication type.

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4. Change the set communication parameters if necessary. When doing so, refer to the detailed description of the communication parameters

5.4.4 USB communication parameters

The following table describes the communication parameters for the USB communication channel:

Communication parameters	Description	Note
Timeout	Waiting time in [ms] that the master waits for a response from a slave after it has sent a request.	Default setting: 350 ms

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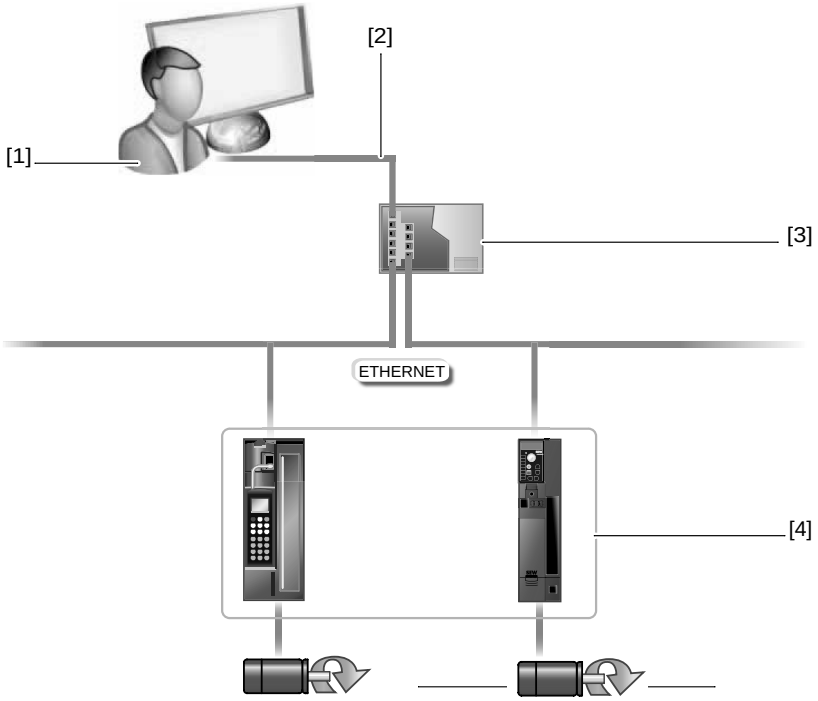
5.5 Communication via Ethernet

5.5.1 Direct communication

Overview

The figure shows the network with direct communication using Ethernet:



1193501835

[1] PC with Ethernet TCP/IP interface
[2] Ethernet TCP/IP connection
[3] Switch
[4] Units (examples) with Ethernet interfaces

Function

Parameter requests from MOVITOOLS® MotionStudio are transferred via Ethernet [2] from a PC [1] to a switch [3] using the Ethernet TCP/IP interface.

The parameter requests are then passed directly on to the Ethernet interface of the units [4] from the switch [3].

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5.5.2 Address Editor

INFORMATION

The Address Editor can only be used with the DHR21B/41B option (connection via X30-1/-2).

Overview

The Address Editor is a freeware tool by SEW-EURODRIVE GmbH & Co KG.

It is available once the "MOVITOOLS® MotionStudio" engineering software is installed. However, it is used separately.

You can use the Address Editor to establish a communication for your units via Ethernet and to address the units.

If you use a patch cable to connect the Ethernet interface of your engineering PC to the Ethernet, the Address Editor detects all Ethernet stations in the connected network segment (local network).

Unlike with "MOVITOOLS® MotionStudio", you will **not** have to adjust the IP address of the engineering PC to the local network.

This means the Address Editor is a useful addition to "MOVITOOLS® MotionStudio".

Proceed as follows if you have added other Ethernet stations to an existing network:

- Start the Address Editor
- Search for Ethernet stations

Once you have found the added Ethernet stations, you have two options:

- Set (address) the detected Ethernet stations according to the network
- Adjust (address) the engineering PC according to the network

Start the Address Editor

You can use the Address Editor once MOVITOOLS® MotionStudio has been installed.

Do the following to start the Address Editor:

1. Close MOVITOOLS® MotionStudio.
2. Start the Address Editor from the Windows start menu via:

   [Start] / [Programs] / [SEW] / MOVITOOLS MotionStudio] / [Address Editor (Address Tool)]

Searching for Ethernet stations

You can use the Address Editor to find Ethernet stations in a network. This is especially useful for finding recently added Ethernet stations. The Address Editor also helps you to locate the Ethernet interface of detected Ethernet stations.

Do the following to search for Ethernet stations and localize the hardware:

1. Select "Ethernet" as the interface for PC and unit. To do so, click on the corresponding option field in the lower part of the window.
2. Click [Next] to confirm your selection and proceed to the next dialog.

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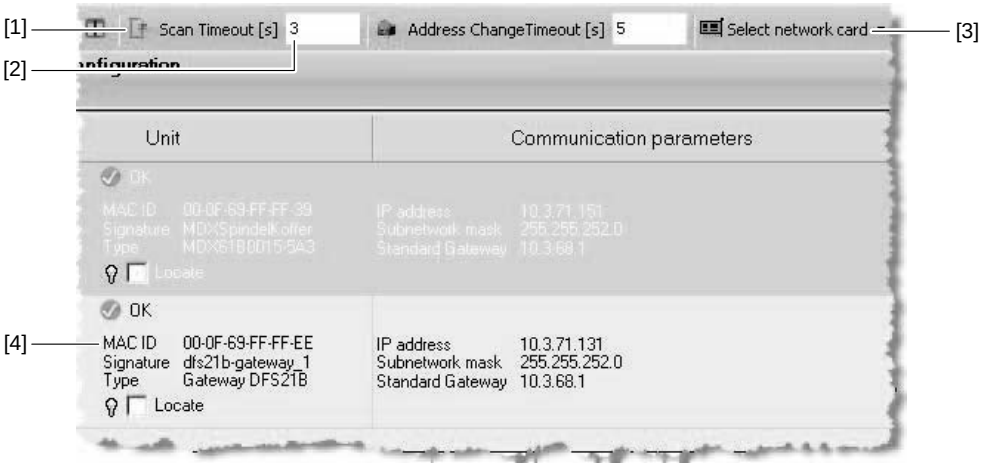
3. Wait for the network scan to start **automatically**. The default setting for the waiting time (scan timeout) is 3 s [2]

   Note: If you no units are detected during the network scan, the wiring might be inadequate, or you have several network cards installed (activated) in your PC.

   In this case, proceed as follows:

   - Select the required card. To do so, click "Select network card" [3] in the toolbar.
   - Start the network scan **manually**. To do so, click "Start network scan" [1] in the toolbar.



9007200768267787

[1] "Start network scan" icon
[2] "Scan timeout" edit box
[3] "Select network card" icon
[4] "Localize" checkbox

As a result, the current addresses of all Ethernet stations in the connected network will be displayed.

4. Mark the "Localize" checkbox [4] to localize an Ethernet station.

   The link/act LED of the first Ethernet interface of the respective Ethernet station will flash green.

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Adjusting located Ethernet stations to the network (addressing)

Proceed as follows to adjust (address) the localized Ethernet stations to the network:

1. Double-click the "Communication parameters" area of the respective unit [1].

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[1] "Communication parameters" window
[2] "Download" button

You can now change the following settings:

- IP address of the Ethernet station
- IP address of the subnet mask
- IP address of the standard gateway
- DHCP startup configuration (if supported by the unit)

2. Transmit the address changes to the Ethernet station. Click on [Download] [2].
3. Switch the unit off and on again in order to apply the changes.

Setting the engineering PC to the network (addressing)

To the following to adapt the engineering PC to the network setting (addressing):

1. Select the following item from the Windows start menu:
   [Start] / [Setup] / [Network connections]
2. Select the corresponding PC interface.
3. Select "Properties" from the context menu.
4. Activate the checkbox with the entry "Internet protocol (TCP/IP)".
5. Click on "Properties".
6. Activate the "Use the following IP address" checkbox.
7. Enter the same IP addresses for the subnet mask and the standard gateway as for the other Ethernet stations in this local network.

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8. For the engineering PC, enter an IP address that meets the following conditions:
   - In the blocks that define the **network**, the address segment for the engineering PC must correspond to the other Ethernet stations.
   - In the blocks that define the **station**, the address segment for the engineering PC must differ from the other stations.
   - The last block must not contain the values "0", "4", "127" or "255".

     NOTE: In the IP address of the subnet mask (such as 255.255.255.0), the values in the blocks have the following meaning:
     - "255", defines the address of the network where the stations are located.
     - "0", defines the address of the actual station to distinguish it from other stations.

5.5.3 Configuring the communication channel via Ethernet

Do the following to configure a communication channel for Ethernet:

1. Click on "Configure communication connections" [1] in the toolbar.

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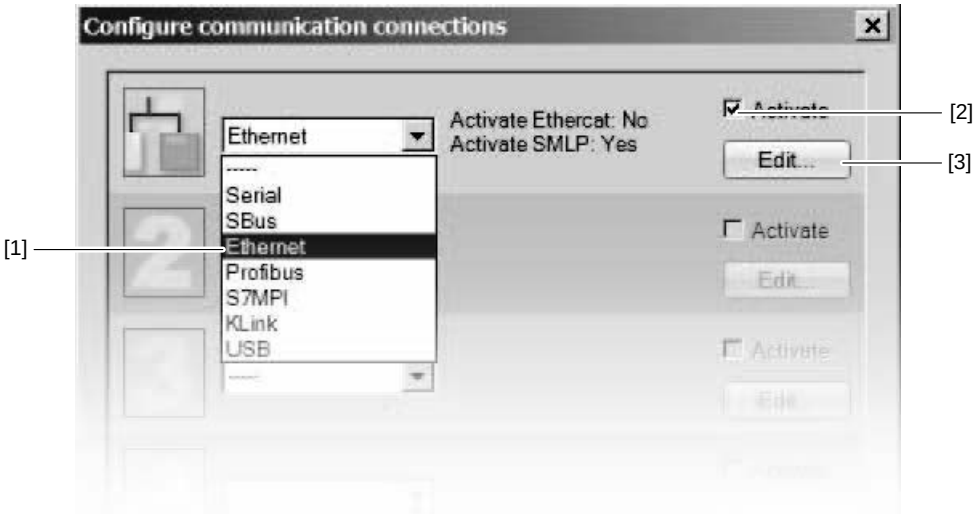
[1] "Configure communication connections" icon

This opens the "Configure communication connections" window.



9007200399122315

[1] "Type of communication" dropdown menu
[2] "Activate" checkbox
[3] [Edit...] button

2. From the list [1], select "Ethernet" as the communication type.

   In the example, "ETHERNET" is activated as the communication type for the first communication channel [2].

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3. Click [Edit] [3] in the right section of the window.

   This will display the settings for the "Ethernet" communication type.

4. Set up the SMLP protocol. To do so, select the "SMLP settings" tab.

   SMLP stands for **S**imple **M**OVI**L**INK® **P**rotocol. This is the SEW-EURODRIVE unit protocol and is transmitted directly via TCP/IP.

5. Set the parameters. Follow the instructions described in the section "Setting communication parameters for SMLP".

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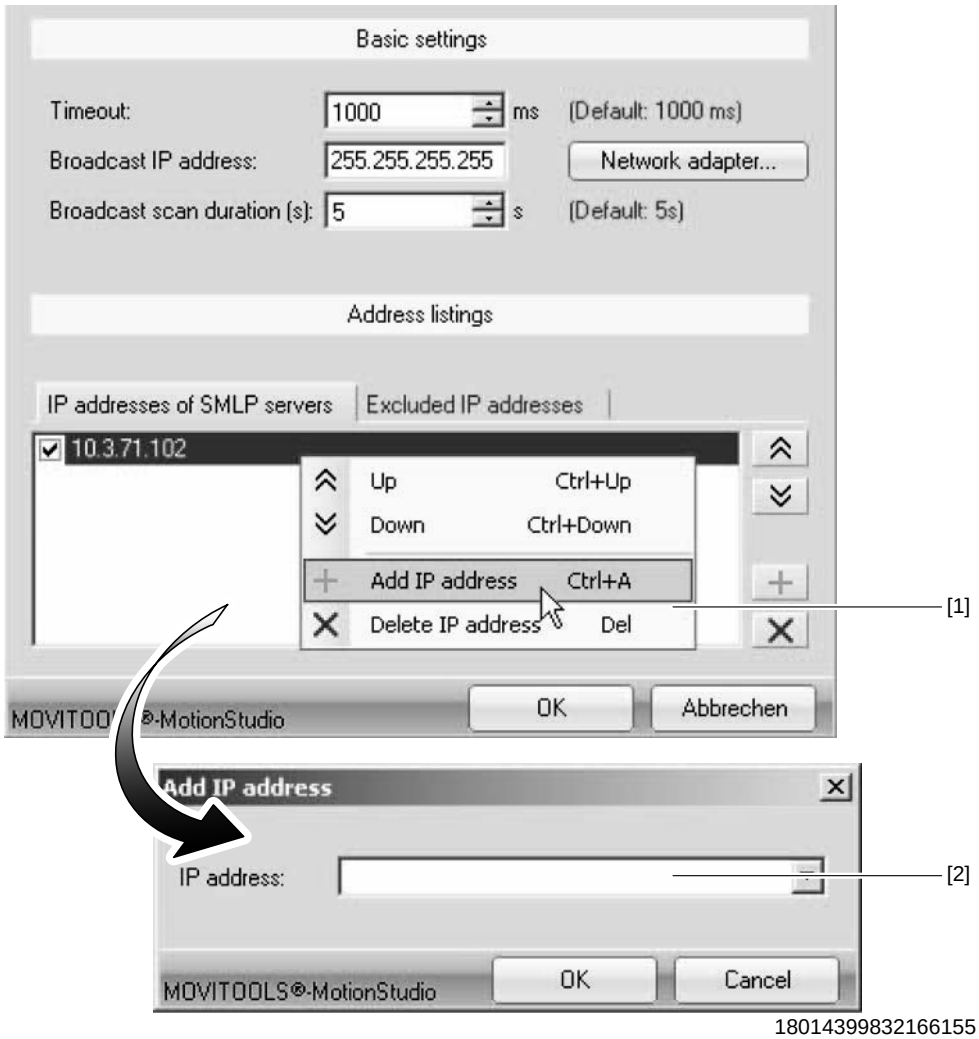
5.5.4 Setting communication parameters for SMLP

Proceed as follows to set the Ethernet communication parameters:

1. Change the set communication parameters if necessary. Refer to the detailed description of the communication parameters for SMLP.

   NOTE: During a unit scan, the system recognizes only units that are in the same (local) network segment as the PC that is running on MOVITOOLS® MotionStudio. If you have units that are outside the local network segment, add the IP addresses of these units to the list of SMLP servers.

2. Add an IP address by opening the context menu and selecting [Add IP address] [1]..



18014399832166155

[1] [Add IP address] button
[2] "IP address" input field

3. Enter the IP address in the input field [2] and click the [OK] button.

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5.5.5 Communication parameters for SMLP

The following table describes the communication parameters for SMLP:

Communication parameters	Description	Note
Timeout	Waiting time in ms that the client waits for a response from the server after it has made a request.	• Default setting: 1000 ms • Increase the value as required if a delay in communication is causing malfunctions.
Broadcast IP address	IP address of the local network segment **within** which the unit scan is carried out.	In the default setting, the unit scan only detects units that are in the local network segment.
IP address of SMLP server	IP address of the SMLP server or of other units that are to be included in the unit scan but are **outside** the local network segment.	• Enter the IP address of units that are to be included in the unit scan but are **outside** the local network segment. • Enter the IP address of the SIMATIC S7 control, if you are operating an indirect Ethernet to PROFIBUS communication via SIMATIC S7.
Excluded IP address	IP addresses of units that should **not** be included in the unit scan	Enter the IP address of units that should **not** be included in the unit scan. This can be units that are not ready for communication (for example because they have not been started up yet)

5.5.6 Communication ports used

The following table describes the communication ports MOVITOOLS® MotionStudio uses:

Application	No. of communication port	Description
ETH server	300	For using a PC as Ethernet gateway with the program "`ETHServer.exe`"
SEW communication server	301	For communication between MOVITOOLS® MotionStudio and the SEW Communication Server
Offline data server	302	For communication of MOVITOOLS® MotionStudio in offline mode
MOVIVISION® server	303	For communication with a PC with active MOVIVISION® server
MOVI-PLC® visualization	304	For communication between MOVI-PLC® and the 3D simulation of MOVITOOLS® MotionStudio
TCI server	305	For communication via TCI
EcEngineeringServer remote control (in preparation)	306	For direct communication (without master) with SEW EtherCAT slaves
EcEngineeringServer mailbox gateway (in preparation)	307	For direct communication (without master) with SEW EtherCAT slaves

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5.6 Executing functions with the units

5.6.1 Parameterizing units

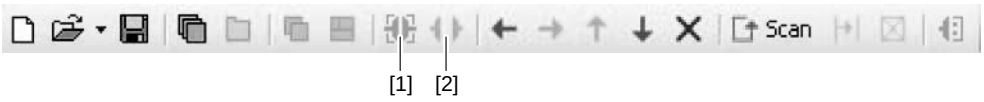
Units are parameterized in the parameter tree. The parameter tree shows all unit parameters grouped in folders.

You can manage unit parameters using the context menu or the toolbar. The following steps illustrate how to read or edit unit parameters.

5.6.2 Reading or changing unit parameters

To read or change unit parameters, proceed as follows:

1. Switch to the required view (project view or network view).
2. Select the communication mode:
   - Click the "Switch to online mode" button [1] if you want to read or change parameters directly on the **unit**.
   - Click the "Switch to offline mode" button [2] if you want to read or change parameters in the **project**.

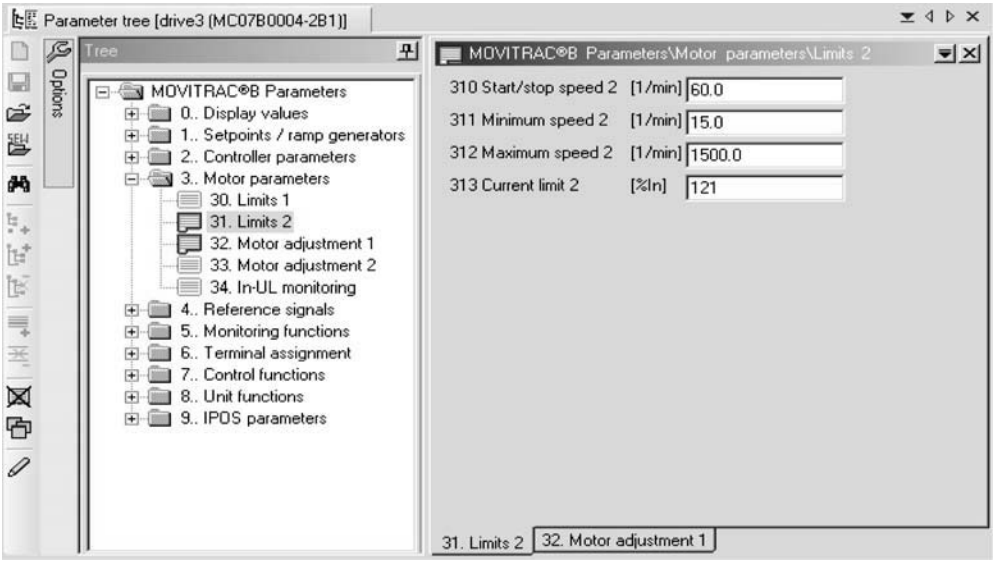


9007200389198219

[1] "Switch to online mode" symbol
[2] "Switch to offline mode" symbol

3. Select the unit you want to set parameters for.
4. Open the context menu and select the [Parameter tree] command.

   The "Parameter tree" view opens on the right section of the screen.
5. Expand the "Parameter tree" up to the node you require.



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6. Double-click to display a particular group of unit parameters.

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7. Press the enter key to finalize any changes you make to numerical values in the input fields.

INFORMATION

- Refer to the parameter list in the unit documentation for detailed information on the unit parameters.

5.6.3 Starting up units (online)

Do the following to start up the units (online):

1. Switch to the network view.
2. In the toolbar, click on "Switch to online mode" [1].

9007200438771211

[1] "Switch to online mode" icon

3. Select the unit you want to startup.
4. Open the context menu and select the command [Startup] / [Startup].

   The Startup wizard opens.
5. Follow the instructions of the startup wizard and then load the startup data into your unit.

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5.7 Configuration and startup of the drives

Configuration and startup of the drives is described in the following library manuals:

Drive	Manual
MOVIDRIVE® B MOVIAXIS®	MPLCMotion_MDX and MPLCMotion_MX for MOVI-PLC® libraries
MOVITRAC® 07 / B MOVIMOT®	MPLCMotion_MC07 and MPLCMotion_MM for MOVI-PLC® libraries

INFORMATION

If you want to operate the DH.21B/41B option installed in MOVIDRIVE® MDX61B, then the firmware of the MOVIDRIVE® MDX61B inverter must have at least status ".16".

This applies regardless of whether the inverter is controlled via the installed DH.21B/41B option or whether the slot of the inverter is only used for installing the DH.21B/41B option while it is simultaneously used to control other inverters (e.g. MOVITRAC® B).

5.8 Configuration and startup in the PLC Editor

INFORMATION

- For further information on configuration and startup of the DH.21B/41B option, refer to the "MOVI-PLC® programming in the PLC Editor" system manual.
- For information on how to configure the master in the various fieldbus systems, refer to the following documents:
  - DHF21B/41B Controller Fieldbus Interfaces DeviceNet and PROFIBUS DP-V1
  - DHR21B/41B Controller Fieldbus Interfaces EtherNet/IP, Modbus/TCP and PROFINET IO

5.9 Replacing the unit

For replacing a DHF21B/41B option, a compact controller or a controlled drive, follow the instructions in the "Assembly and Installation Notes" chapter. Insert the SD card of the previous controller into the new controller.

INFORMATION

The variable values stored remanently on the DH.21B/41B option are not stored on the SD card by default. This can be programmed through the application (IEC program), or the data backup must be imported through the project management in MOVITOOLS® MotionStudio.

For information on replacing the drives, please refer to the manual of the inverter in question.

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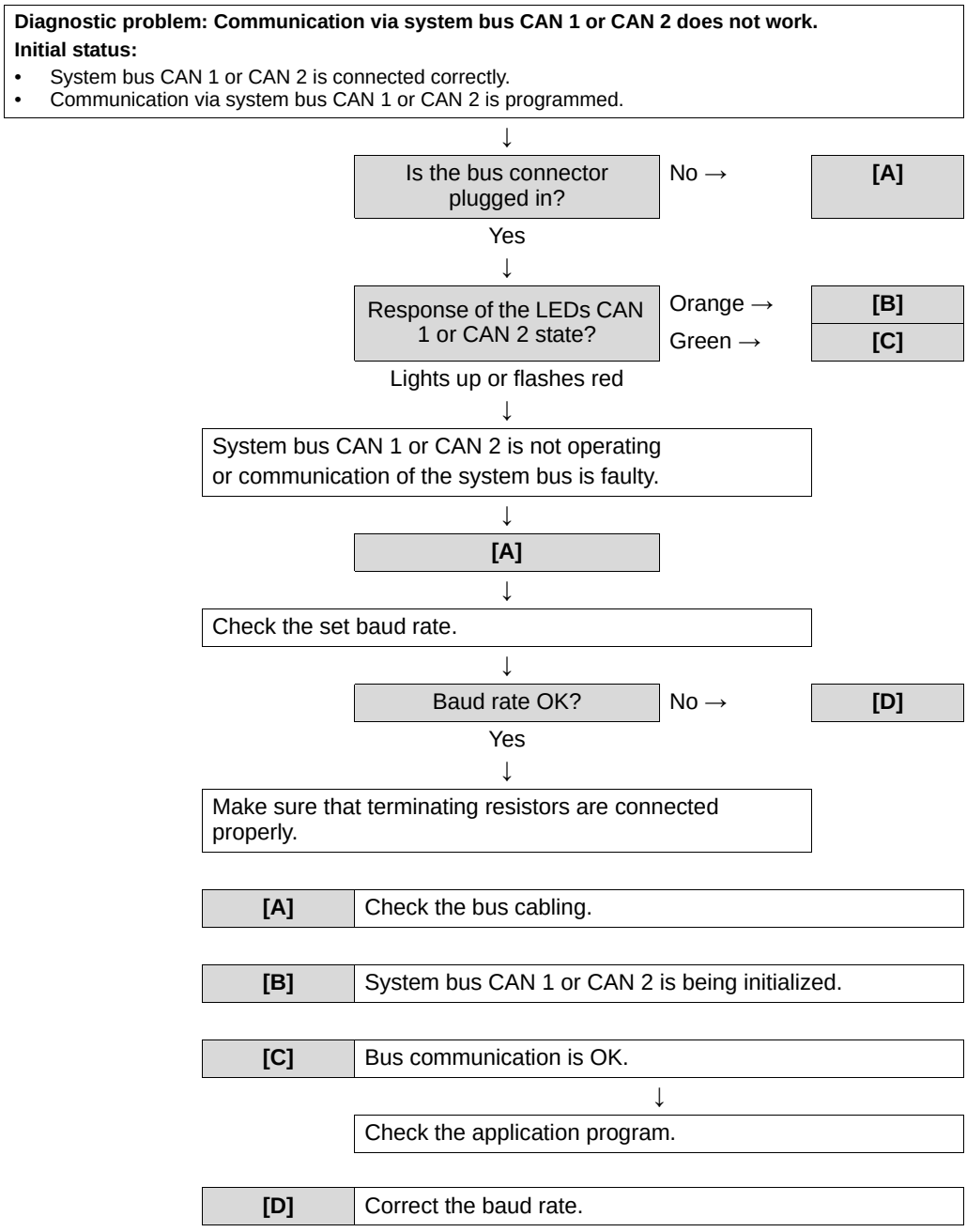
6 Error Diagnostics

6.1 Diagnostic procedure CAN 1/CAN 2 system bus


Diagnostic problem: Communication via system bus CAN 1 or CAN 2 does not work.
Initial status:
• System bus CAN 1 or CAN 2 is connected correctly.
• Communication via system bus CAN 1 or CAN 2 is programmed.
Is the bus connector plugged in?
No →
[A]
Yes
Response of the LEDs CAN 1 or CAN 2 state?
Orange →
[B]
Green →
[C]
Lights up or flashes red
System bus CAN 1 or CAN 2 is not operating or communication of the system bus is faulty.
[A]
Check the set baud rate.
Baud rate OK?
No →
[D]
Yes
Make sure that terminating resistors are connected properly.
[A] Check the bus cabling.
[B] System bus CAN 1 or CAN 2 is being initialized.
[C] Bus communication is OK.
Check the application program.
[D] Correct the baud rate.

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7 Technical Data and Dimension Drawings

7.1 General technical data

The general technical data listed in the following table applies to:

- DH.21B/41B option installed in the inverter
- DH.21B/41B/UOH.B stand-alone unit

General technical data	
Interference immunity	Meets EN 61800-3
Ambient temperature	Installed in MOVIDRIVE® MDX61B: • 0 °C to +60 °C (Derating at 40 °C to 60 °C → System manual MOVIDRIVE® MDX60B/61B) Installed in MOVITRAC® B (AC 230 V; AC 400/500 V up to 4 kW): • –10 °C to +60 °C (Derating at 40 °C to 60 °C → System manual MOVITRAC® B) Installed in MOVITRAC® B (AC 400/500 V over 4 kW): • 0 °C to +60 °C (Derating at 40 °C to 60 °C → System manual MOVITRAC® B) Installed in the MOVIAXIS® master module: • 0 °C to +45 °C Compact controller: • –10 °C to +60 °C
Climate class	EN 60721-3-3, class 3K3
Storage temperature	–25 °C to +70 °C
Climate class	EN 60721-3-3, class 3K3
Type of cooling	Convection cooling
Degree of protection	IP20
Duty cycle	Continuous duty (see MOVIDRIVE® MDX60B/61B, MOVITRAC® B, MOVIAXIS® system manuals)
Pollution class	2 according to IEC 60664-1 (VDE0110-1)
Installation altitude	max. 4000 m (NN)

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7.2 DHE21B/41B option

DHE21B/41B option	
Part number	• DHE21B option: 1823 607 3 DHE41B option: 1821 160 7
Electrical supply	The following applies to all units (MDX, MX, compact controller): • You have to supply the binary inputs and outputs separately with DC 24 V (X31:1/2). Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 6.8 W • Option DHE21B/41B is supplied by MOVIDRIVE® MDX61B via backplane connector. • In the case of disconnection from the power supply, continued function is guaranteed by the DC 24 backup mode (external DC 24 V supply to X10:9/10 of MOVIDRIVE® MDX61B required). Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 8.5 W • U = DC 24 V (–15 % / +20 %) • I_{max} = 600 mA • Option DHE21B/41B can be supplied from the MOVIAXIS® switched-mode power supply (MXS) or from an external voltage source. To do so, connect X5 between the individual units. • If the DHE21B/41B option is supplied with DC 24 V from the MOVIAXIS® switched-mode power supply, then the function of the DHE21B/41B option is ensured when power supply is switched off (external DC 24 V supply at X16 of the MOVIAXIS® switched-mode power supply).
Potential levels	Option DHE21B/41B has the following potential levels: • Potential control / CAN 1 / COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2
Memory	• Retain data: 32 kByte • System variables (retain): 8 kByte Program memory: • DHE21B: 2 MByte (for application program, incl. IEC libraries) • DHE41B: 6 MByte (for application program, incl. IEC libraries) Data memory: • DHE21B: 4 MByte (for IEC application) • DHE41B: 8 MByte (for IEC application)
Binary inputs	Isolated (optocoupler), PLC compatible (IEC 61131-2), sampling interval corresponds to task cycle time.
X31:3 – X31:10	Can be configured as binary inputs or outputs
Internal resistance	$R_i \approx 3\ k\Omega$, $I_E \approx 10$ mA
Signal level	DC (+13 V to +30 V) = "1" = contact closed (according to IEC 61131) DC (–3 V to +5 V) = "0" = contact open (according to IEC 61131)
Binary outputs	PLC-compatible (IEC 61131-2), response time 1 ms
X31:3 – X31:10	Can be configured as binary inputs or outputs Maximum permitted output current I_{A_max} = DC 150 mA per binary output All 8 binary outputs can be subject to the maximum approved output current I_{A_max} load at the same time.
Signal level	"0" = 0 V "1" = DC +24 V
CAN 2 system bus **X32:1 – X32:3** **CAN 1 system bus** **X33:1 – X33:3**	• System bus CAN 1 and CAN 2 to CAN specification 2.0, parts A and B, transmission technology to ISO 11898 • The CAN 2 system bus is electrically isolated • Max. 64 stations (DHE41B) / 16 stations (DHE21B) per CAN system bus • Max. 64 (DHE41B) / 16 (DHE21B) SCOM transmit objects / 256 receive objects per CAN system bus • Address range 0 - 63 • Baud rate: 125 kBd – 1 MBd • If X32 or X33 is the bus terminator, you must connect a terminating resistor (120 Ω) externally. • You can remove connector X32 or X33 without interrupting the system bus. • The system bus can be run in layer 2 (SCOM cyclic, acyclic) or in accordance with the SEW-MOVILINK® protocol.

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DHE21B/41B option	
Ethernet 1	Fast system bus SBUS$^{Plus®}$ based on EtherCAT (with DH.41B)
Ethernet 2	• TCP/IP • Connection options: Engineering PC, other controller, Intranet
USB	USB 1.0 for connecting an engineering PC
RS485 interface COM1/2 **X34:1 – X34:6**	• One DOP11B operator panel or one gearmotor with integrated MOVIMOT® frequency inverter can be connected per RS485 interface. • I/O standard, 57.6 / 9.6 kBaud, max. total cable length 200 m • Dynamic terminating resistor with fixed installation • COM 2 is electrically isolated from the DH.21B/41B option
SD memory cards **OMH41B-T0 – T25** **OMC41B-T0 – T25**	• PC-readable • Includes: – Firmware – IEC program – Data • At least 128 MB memory
Engineering	Engineering is carried out via the Ethernet 2 interface (X37) or USB interface (X35) The engineering of any SEW components connected to the DHE21B/41B option can be carried out via the DHE21B/41B option. Engineering of option DHE21B/41B cannot be carried out via the inverters. • MOVITOOLS® MotionStudio PC software with PLC Editor

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7.3 DHF21B/41B option

INFORMATION

Connections identical with those of the DHE21B/41B option are described in the "DHE21B/41B option" chapter.

DHF21B/41B option	
Part number	• DHF21B: 1823 608 1 • DHF41B: 1821 161 5
Electrical supply	Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 8 W Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 10 W
Potential levels	Option DHF21B/41B has the following potential levels: • Potential control / CAN 1 / COM1 • Potential COM2 • Potential binary inputs and outputs • Potential system bus CAN 2 • Potential PROFIBUS
PROFIBUS connection **X30P:1 – X30P:9**	via 9-pin sub D connector, pin assignment to IEC 61158
Bus termination	Not integrated. Activate bus termination with suitable PROFIBUS connector with switchable terminating resistors.
Automatic baud rate detection	9.6 kBd – 12 MBd
DeviceNet connection **X30D:1 – X30D:5**	• 2-wire bus and 2-wire supply voltage DC 24 V with 5-pole Phoenix terminal • Pin assignment according to DeviceNet specification
Baud rate	125, 250 or 500 kBaud, can be set using DIP switches 2^6 and 2^7
Bus cable length	For thick cable according to DeviceNet specification 2.0 appendix B: • 500 m at 125 kBd • 250 m at 250 kBd • 100 m at 500 kBd
MAC ID	0 – 63, can be set using DIP switch 2^0 – 2^5 Max. 64 stations
Engineering	Additional engineering access via the PROFIBUS interface (X30P)

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7.4 DHR21B/41B option

INFORMATION

Connections identical with those of the DHE21B/41B and DHF21B/41B options are described chapters "DHE21B/41B option" and "DHF21B/41B option".

DHR21B/41B option	
Part number	• DHR21B: 1823 610 3 • DHR41B: 1821 632 3
Electrical supply	Installed in MOVIDRIVE® MDX61B: • Power consumption: P_{max} = 9.5 W Installed in the MOVIAXIS® master module (MXM): • Power consumption: P_{max} = 12 W
Ethernet connection X30-1, X30-2	Via RJ45 socket, pin assignment according to IEC 11801 Integrated Ethernet switch with autocrossing and autonegotiation functionality.
Engineering	Additional engineering access via PROFINET, EtherNet/IP and Modbus TCP/IP interface (X30:1/2)

7.5 Stand-alone unit

Stand-alone unit	
Unit types	• DHE21B/41B / UOH11B • DHF21B/41B / UOH21B • DHR21B/41B / UOH21B
Electrical supply	• X26: U = DC 24 V (–15 % / +20 %) DGND must be grounded (PELV) • Power consumption P_{max} = 8.5 W, I_{max} = 600 mA • X31: You must supply the binary inputs and outputs separately with DC 24 V.

INFORMATION

Note the following:

- The CAN 1 system bus is connected in parallel to X33 and X26.
- The RS485 interface COM1 is connected in parallel to X34 and X24.
- The remaining technical data is identical to that in chapters 7.1 and 7.2.

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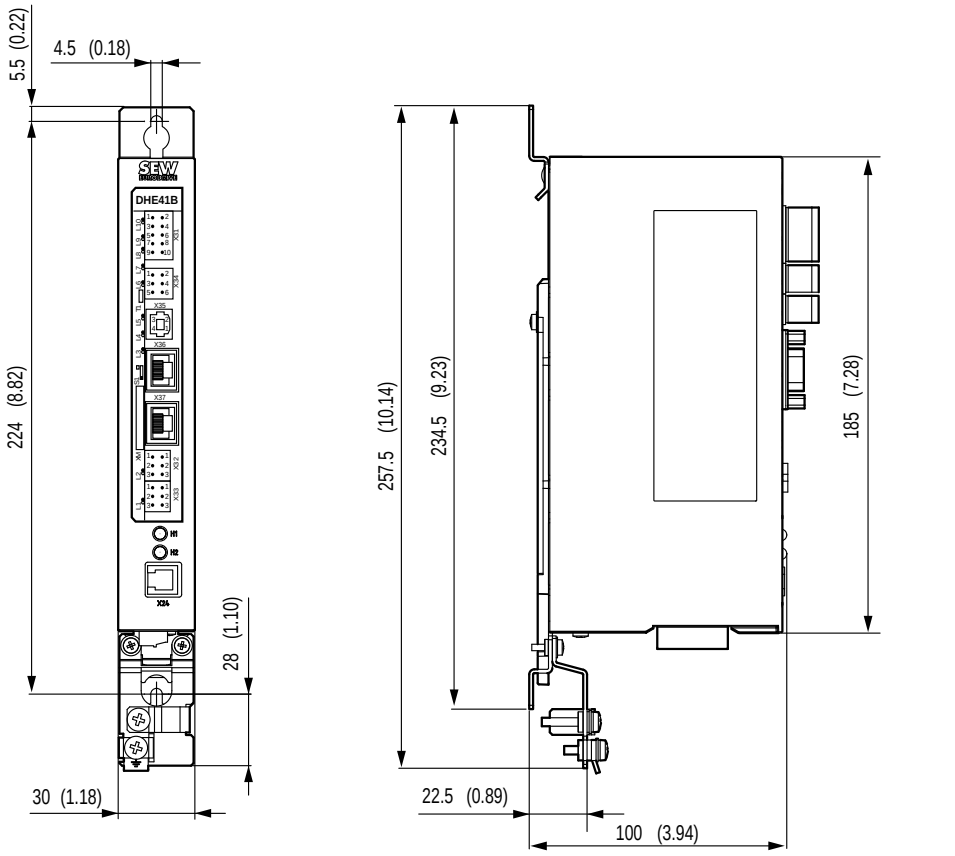
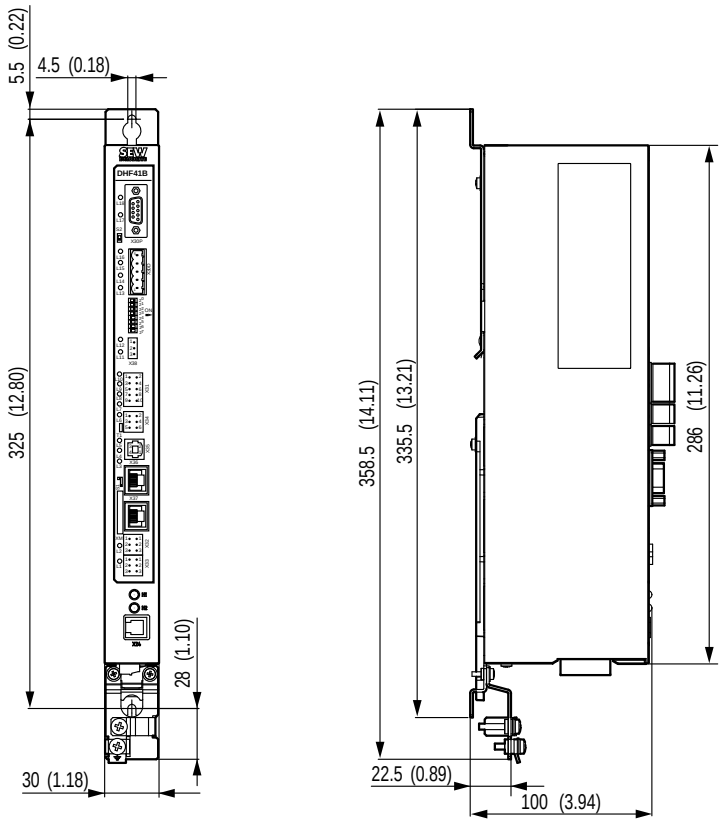
7.6 Dimension drawings for stand-alone unit DH.21B/41B/UOH..B

7.6.1 Dimension drawing for DHE21B/41B / UOH11B



The dimensions are specified in m (in).

7.6.2 Dimension drawing for DHF/DHR21B/41B / UOH21B



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The dimensions are specified in m (in).

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